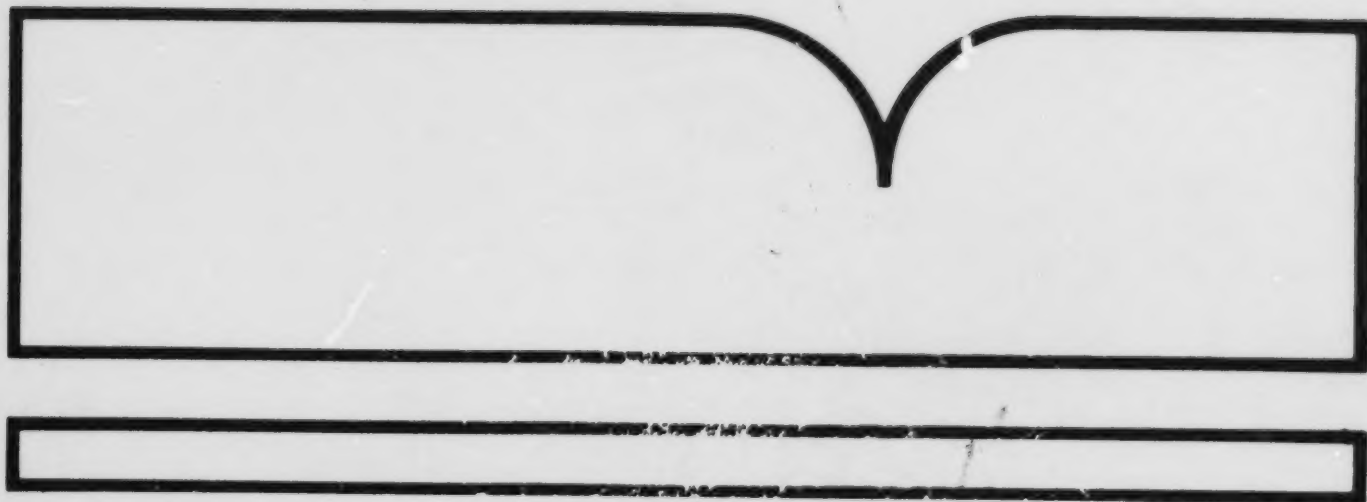


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Sulfur Deposition Modeling in Support of the
U.S./Canadian Memorandum of Intent on Acid Rain

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SULFUR DEPOSITION MODELING IN SUPPORT OF THE
U.S./CANADIAN MEMORANDUM OF INTENT ON ACID RAIN

by

Terry L. Clark
Dale H. Coventry
Meteorology and Assessment Division
Environmental Sciences Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

ENVIRONMENTAL SCIENCES RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

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AFFILIATION

Mr. Clark and Mr. Coventry, meteorologists in the Meteorology and Assessment Division, Environmental Sciences Research Laboratory, Research Triangle Park, NC 27711, are on assignment from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

PREFACE

On August 5, 1980, the United States and Canada signed the Memorandum of Intent on Transboundary Air Pollution, which established bilateral scientific work groups to develop a consensus on the nature of the transboundary air pollution problem. The resulting consensus would then provide the basis for the negotiation of a cooperative agreement on the problem.

During the ensuing year, the Environmental Sciences Research Laboratory (ESRL) of the U.S. Environmental Protection Agency (EPA) at Research Triangle Park, North Carolina, participated in the Atmospheric Sciences and Analysis Work Group (Work Group 2). The goals of this work group were 1) to describe the current state of the knowledge of long-range transport, chemical transformation, and wet and dry sulfur deposition modeling, 2) to define source/receptor relationships, particularly for sensitive areas of eastern North America, and 3) to assess and intercompare model results using atmospheric and precipitation chemistry measurements.

To accomplish these goals, Work Group 2 selected eight Canadian and U.S. long-range transport models to be applied by the Regional Modeling Subgroup. The Eastern North American Model of Air Pollution (ENAMAP-1), developed by SRI International under EPA sponsorship, was one of the models selected. This report describes in detail the technical aspects of the model and the results of the applications performed at the request of Work Group 2. This report documents the actual scientific work performed by ESRL; a condensation of the material in this report is presented in the Work Group 2 and Regional Modeling Subgroup Final Reports.

The model results presented and discussed in this report are deemed to be preliminary and should not be used as a basis for the development of regulatory policies. The results of these model applications are documented solely for the benefit of the scientific community. Further model input/output and parameterization uncertainty analyses and a rigorous validation study must be accomplished to establish the credibility of the model before it can be used as a regulatory tool. The uncertainty analyses and the model validation study are to be conducted during 1983 and 1984.

ABSTRACT

At the request of the U.S./Canadian Work Group 2 of the Acid Rain Memorandum of Intent, the Eastern North American Model of Air Pollution (EMAMAP-1) was applied to simulate the monthly wet and dry depositions and monthly averaged ambient concentrations of SO_2 and $\text{SO}_4^{=}$ for January and July 1978 across eastern North America. Using these model results, unit emissions (1.0 Tg S yr^{-1}) transfer matrices, which describe source/receptor relationships, were generated and a model performance study was undertaken. In addition, a model sensitivity study was conducted to examine the consequence of model input parameter uncertainties.

The unit emission transfer matrices indicated that in July those source regions closest to the sensitive receptors dominated the sulfur wet deposition at those receptors. During January, the contributions from the more distant source regions increased significantly and one source region did not dominate the sulfur deposition across the north-eastern U.S. sensitive receptors.

The January and July 1978 model results compared favorably with the measured sulfur wet depositions (16 observations) and monthly averaged ambient $\text{SO}_4^{=}$ concentrations (76 observations). The mean residuals of the former and latter were of the order of 0.25 kg ha^{-1} and $0.4 \mu \text{g m}^{-3}$, respectively. The mean calculations were within 20% of the mean sulfur wet deposition and within 8% of the mean ambient $\text{SO}_4^{=}$ concentrations.

The sensitivity analysis, which examined changes in the calculations as a function of downwind distance, up to 1500 km from a single source, indicated that for high transport wind speeds ($>35 \text{ km h}^{-1}$), a saw-toothed downwind distribution of depositions and concentrations resulted from simulations using 2- and 3-h time steps. The saw-toothed distribution also was noted for moderate wind speeds (>20 , but $<35 \text{ km h}^{-1}$) in the simulations using 3-h time steps. In general, the greatest changes

in the SO_2 wet depositions and ambient concentrations occurred within 200 km of the source, while those in the $\text{SO}_4^{=}$ wet depositions and ambient concentrations occurred beyond 300 km.

This report discusses the work performed from October 1, 1981 to April 30, 1982.

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SECTION 1

INTRODUCTION

In the mid 1970's, SRI International developed a Lagrangian-puff air pollution model, European Regional Model of Air Pollution (EURMAP) for the Federal Environment Office of the Federal Republic of Germany (Johnson et al., 1978). This regional model was capable of calculating monthly SO_2 and $\text{SO}_4^{=}$ concentrations and dry and wet deposition patterns and international exchanges of sulfur across 13 countries of western and central Europe.

In the late 1970's, the U.S. Environmental Protection Agency (EPA) sponsored SRI International to adapt and apply EURMAP to eastern North America. The adapted version of this model, ENAMAP (Eastern North American Model of Air Pollution), was capable of calculating monthly SO_2 and $\text{SO}_4^{=}$ concentrations and dry and wet deposition patterns and interregional exchanges of sulfur across a user-defined number of regions (Bhumralkar et al., 1980). Thus it was possible to assess the impact of sulfur emissions from individual sites and provinces on the sulfur concentrations and depositions across the same regions.

In 1981, the ENAMAP-1 model was included as one of eight long-range sulfur pollution models applied by the Atmospheric Sciences and Analysis Work Group (Work Group 2) of the U.S./Canadian Memorandum of Intent on Transboundary Air Pollution. This report summarizes the work performed by ESRL at the request of Work Group 2. Such work included the application of the ENAMAP-1 model using January and July 1978 input data to generate transfer matrices, to assess model performance, and to analyze model sensitivity in input parameters.

SECTION 2

MODEL DESCRIPTION

Parameterizations

Basic structure

In the design and development of any air quality simulation model, there are usually two conflicting goals: maximum realism and accuracy on one hand, and minimum computational requirements on the other. Greater realism and accuracy usually require more detailed information and sophisticated formulations of physical processes, which in turn require more computer time and memory capacity. It was clear from the outset that the computer requirements could be severe for two reasons:

- 1) The model must treat a very large geographical area (2870 km north to south and 3220 km east to west) and yet preserve acceptable spatial resolution (70 by 70 km).
- 2) The model must compute monthly and annual mean concentration and deposition fields while preserving the original temporal resolution (12 h) of standard meteorological data; thus, the model must make repetitive calculations for long sequences of input data.

Accordingly, as a first step, it was desirable to design a very simple model having minimum computer requirements (i.e., a practical and economical model that would offer acceptable realism in simulating the most important processes involved in the transboundary sulfur pollution problem. More sophisticated parameterizations can replace the simplistic approaches described here as knowledge of the appropriate physical processes accumulates. Later, the simplistic parameterizations of vertical

mixing, dry and wet depositions, and transformations of SO_2 will be replaced by more sophisticated parameterizations by the end of 1982. Also by the end of 1982, NO_x chemistry will be added to the model.

ENAMAP-1 can calculate SO_2 and $\text{SO}_4^{=}$ concentrations, wet and dry depositions, and interregional sulfur exchanges across a 46 by 41 grid network with a 70-km resolution (Figure 1). Basically, ENAMAP-1 is a mass-conserving, Lagrangian puff model. Linear chemical processes within each puff are parameterized as the puff is transported across the modeling domain. No additional emissions are added to the puff while it is transported.

The concentrations within and the depositions from each puff are calculated at 3-h intervals. The calculated concentrations and depositions at each 3-h interval are apportioned to the grid cells depicted in Figure 1 on the basis of the portion of the puff area in each of these cells.

The rate of loss of mass of SO_2 (dM_1/dt) and $\text{SO}_4^{=}$ (dM_2/dt) from each puff can be expressed by the following:

$$dM_1/dt = -M(k_t + k_{d1} + k_{w1}) \quad \text{and}$$

$$dM_2/dt = -M(-3k_t/2 + k_{d2} + k_{w2})$$

where M = mass (kton)

t = time (h)

k_t = transformation rate of SO_2 to $\text{SO}_4^{=}$ (h^{-1})

k_d = dry deposition rate (h^{-1})

k_w = wet deposition rate (h^{-1}).

The 3/2 factor in the second equation is the ratio of molecular weights between $\text{SO}_4^{=}$ and SO_2 .

It should be noted that there are significant disagreements among atmospheric scientists about the magnitude of these rates. This lack of a consensus is responsible, to a significant degree, for the wide variations in the model results generated by the eight models of Work Group 2.

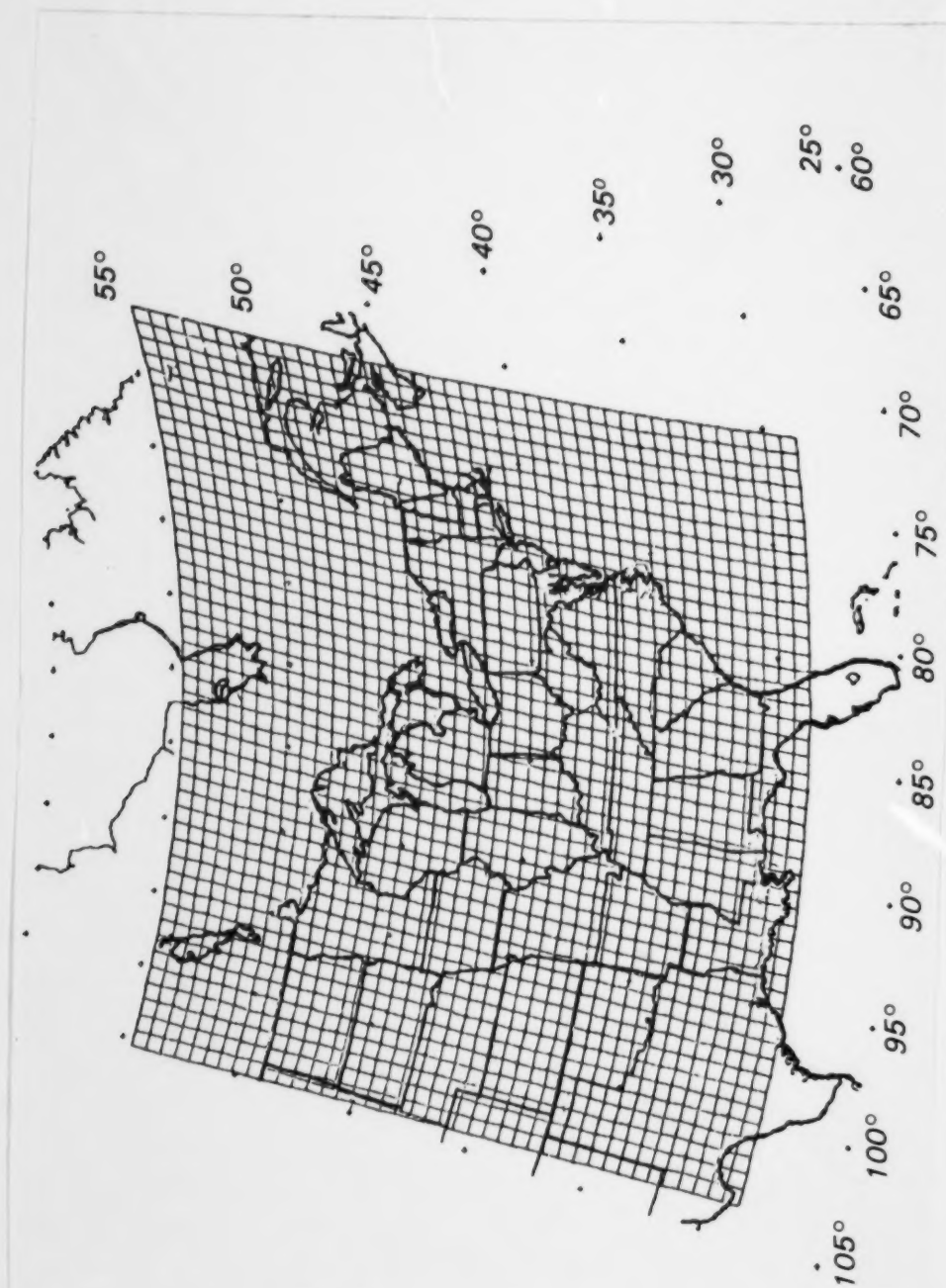


Figure 1. The 46 by 41 ENAMAP-1 grid network.

Pollutant Transport

Discrete puffs of SO_2 and SO_4^- are released every 12 h from the 70 by 70 km emission grid cells, which coincide with the receptor cells. The mass of pollutants in each new puff is determined by dividing the annual emissions in each cell by 730, the number of 12-h periods in a year. As Figure 2 illustrates, these puffs are transported using 3-h time steps until 1) the puff is transported out of the model domain or 2) the mass of SO_2 and SO_4^- in the puff decreases to less than 0.01 and 0.001 kton, respectively.

The individual puffs are transported across the model grid using vertically integrated and horizontally interpolated wind fields applicable at the respective time period. The generation of these wind fields is discussed in a subsequent subsection.

Diffusion

Since, on the regional scale, diffusion is less significant than the transport and removal processes, ENAMAP-1 parameterizes horizontal and vertical diffusion very simply. Upon release, each puff is assumed to diffuse vertically in a manner that produces, instantly, a thoroughly mixed layer between the surface of the earth and the user-specified mixing height.

As parameterized in the model, the mixing height, H (km), is uniform across the grid network. The actual value used in the model applications for a month long period does not change and is determined solely on the season according to the relation:

$$H = 1.3 + 0.15 S$$

where $S = -1$ in winter, $+1$ in summer, and 0 in spring/autumn. The value ranges from 1.15 km in winter to 1.45 km in summer. The model parameterizes diffusion across the top of the mixed layer according to a user-specified rate.

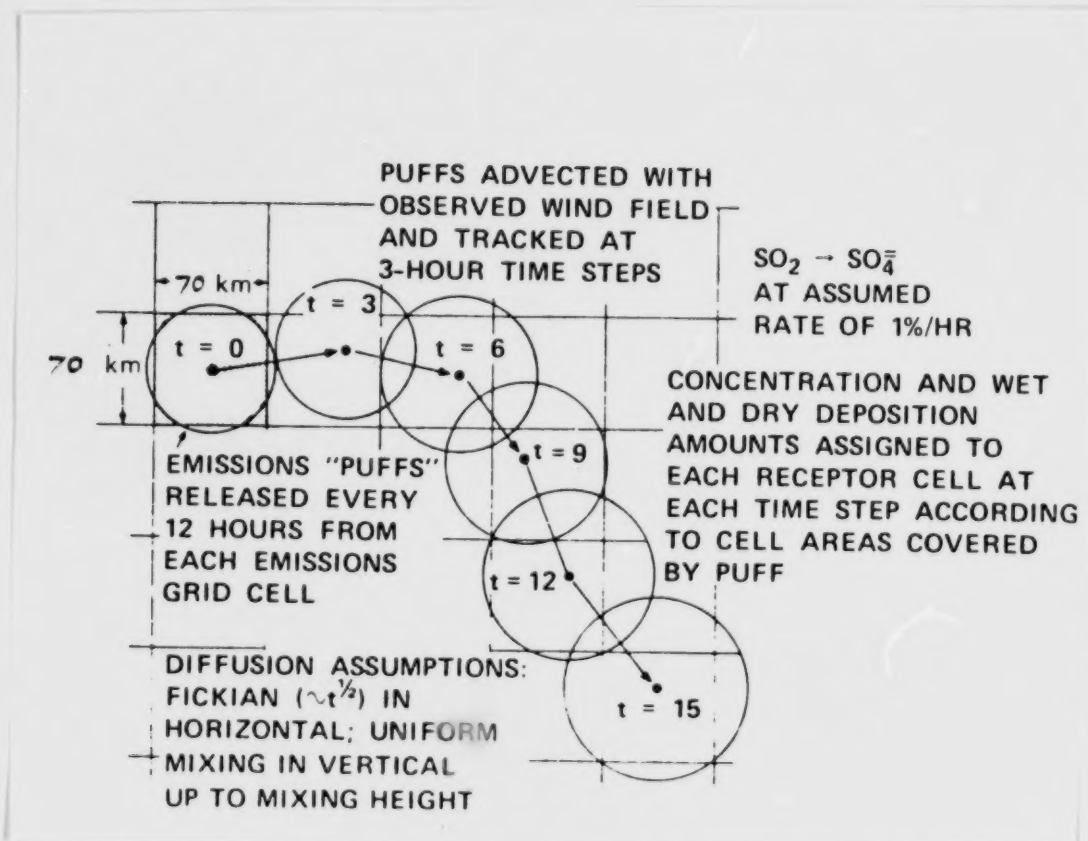


Figure 2. Depiction and summary of ENAMAP-1 parameterizations.

The initial horizontal cross-sectional area of each puff is defined as the area of a 70-grid square. Fickian diffusion is then assumed during the transport of the puffs so that at any time, t (h), the radius, r (km), of any puff is

$$r = (r_0^2 + K_h t)^{1/2}$$

where r_0 is the initial radius of the puff (km) and K_h is the horizontal eddy diffusion coefficient ($36 \text{ km}^2 \text{ h}^{-1}$, or approximately $10^4 \text{ m}^2 \text{ s}^{-1}$).

Transformation

Although transformation of SO_2 to SO_4^- is recognized to be a significant complex process in long-range transport, ENAMAP-1 parameterizes this process very simply. The transformation rate seems to be dependent upon many factors, some of which (e.g., relative humidity, clouds, precipitation type, atmospheric stability, and solar radiation) can be parameterized with a tolerable degree of accuracy and some of which (e.g., concentrations of other chemical species, such as ammonia and metal catalysts) cannot (Weber, 1971). However, the relationships between the transformation rate and many of these factors are not precisely known. Until these relationships are better known, the simplistic treatment of the transformation seems to be a reasonable approach.

In the ENAMAP-1 model, the transformation rate is constant throughout the modeling period: it does not vary with latitude, season, time of day, or precipitation. A value of the transformation rate was chosen after a review of field, laboratory, and theoretical studies was conducted by SRI International. Table 1 lists the values suggested by some atmospheric scientists and those selected for use in ENAMAP-1. The significant disagreement evident in Table 1 reflects the lack of reliable experimental derived values.

TABLE 1. TRANSFORMATION AND DEPOSITION RATES
SUGGESTED BY SEVERAL INVESTIGATORS

Investigator	SO ₂ to SO ₄ ⁻ transformation rate (h ⁻¹)	Deposition coefficients (h ⁻¹)			
		Dry		Wet#	
		SO ₂	SO ₄ ⁻	SO ₂	SO ₄ ⁻
Ottar (1978)	0.007	0.036	0.0144	0.144	-
Renne and Elliott (1976)	0.050	0.036	0.0036	0.500	0.050
Rao et al. (1976)	0.015	-	-	-	-
McMahon et al. (1976)	0.010-0.020	0.054	0.0070	0.216	0.108
Johnson et al. (1978)	0.010	0.029	0.0070	0.216	0.070
Bhumralkar et al. (1980)*	0.010	0.037	0.0070	0.280	0.70

* These values were used in ENAMAP-1 applications.

The values presented are the washout coefficients, w_c , where $k_w = w_c R$ and R is the precipitation rate (mm h⁻¹).

Dry Deposition

Of all the parameters in the model, dry depositions of SO₂ and SO₄⁻ are probably the most difficult to ascertain. First of all, the dry deposition rates depend on specific types of vegetation and material surfaces. Secondly, these pollutants are removed from the atmosphere as both aerosols and gases at different rates. Thirdly, there is no widely accepted procedure to measure dry deposition, making it nearly impossible to relate the theories with measurements.

ENAMAP-1 parameterizes the dry deposition of SO₂ and of SO₄⁻ very simply. They are not expressed as functions of land use, time of day, or the state of the pollutants (aerosol or gaseous), but are treated as constants throughout the modeling period. The rates selected (identified in Table 1) were determined from a consensus of values published in the literature. These rates were used in earlier model applications performed by SRI, International. For the Work Group 2 work, however, the January dry deposition rates of SO₂ and SO₄⁻ were defined as 0.38 and 0.22 cm s⁻¹, respectively; the July rates were defined as 0.48 and 0.28 cm s⁻¹. These rates were selected on the basis of suggestions by Shieh et al. (1979) and the other Work Group 2 modelers.

Wet Deposition

Although the wet deposition process is thought to be a function of the cloud chemistry, cloud formation process, and the type of precipitation, ENAMAP-1 parameterizes it as only a function of the precipitation rate. For every 3-h simulation time step, the model determines, via preprocessed, objectively analyzed precipitation fields, the precipitation intensity in the vicinity of each puff. The 3-h precipitation rates are then multiplied by the washout coefficients for SO_2 and $\text{SO}_4^{=}$ (0.28 and 0.07 h^{-1} , respectively) to determine the total wet deposition from each puff during each time step.

In the planned final ENAMAP version, the wet depositions are to be functions of the precipitation rate raised to an empirically derived power. This type of expression was used by Scott (1978) and McNaughton (1980).

Deposition and Concentration Patterns

After each pollutant puff has been transported for a 3-h period, the amount of SO_2 transformed to $\text{SO}_4^{=}$, the resulting SO_2 and $\text{SO}_4^{=}$ concentrations, and the amount of SO_2 and $\text{SO}_4^{=}$ deposited from the puffs are determined in that order. Immediately afterwards, the 3-h depositions are apportioned to the receptor grid squares according to the percentage of the cross-sectional area of the puff over each square. The mass of each pollutant is similarly apportioned to each square.

The monthly SO_2 and $\text{SO}_4^{=}$ deposition patterns at the end of the month-long simulation period are obtained by summing the 3-h contributions of each puff to each receptor square. Likewise, the 3-h contributions of the mass of the two pollutants are summed for each grid square. Monthly average SO_2 and $\text{SO}_4^{=}$ concentration patterns are then obtained by dividing these sums by the number of 3-h time steps in the month and the volume of the receptor cell. The mass is assumed to be evenly distributed across each cell.

METEOROLOGICAL FIELDS

Transport Wind

Transport wind fields were generated at 3-h intervals using the 70-km receptor grid network and the 12-h upper-air wind data from several Canadian and about 50 U.S. sites. At each of these data sites, average u and v components of the transport wind within the simulated mixed layer were determined by the following formulae:

$$\bar{u} = \sum_{i=2}^I \frac{(u_i + u_{i-1})}{2} * (h_i - h_{i-1})$$

$$\bar{v} = \sum_{i=2}^I \frac{(v_i + v_{i-1})}{2} * (h_i - h_{i-1})$$

The subscripts denote pressure levels where wind data are available and I represents the pressure level closest to the simulated mixing height.

The 46 by 41 transport wind fields were then generated from these layer-averaged wind components by a distance-weighted interpolation scheme using the weighting factor

$$w = \frac{c^2}{c^2 + R^2}$$

where c is 2500 km and R is the distance (km) between the grid point and the observation point.

Precipitation

Precipitation data with a resolution of 1 h were obtained from a dense network of 2000 observational sites within the eastern and central U.S. In addition, precipitation data with a resolution of 6 h were obtained from less than 200 observational sites (usually at airports) across the eastern and central U.S. and southern Canada.

Precipitation fields were generated for 3-h intervals using the same 70-km grid network. For each grid cell containing a 6-h precipitation monitoring site, the 6-h average precipitation rate was computed. Next, 3-h average precipitation rates were computed for these cells by assuming that the measured 6-h precipitation occurred at a constant rate. For cells containing 1-h precipitation monitoring sites, the 1-h rates were summed to produce 3-h rates. Finally, the average 3-h precipitation rate was computed for each grid cell for which data were available.

For grid cells containing no precipitation monitoring sites, but adjacent to at least two cells containing such sites, simple linear interpolation was applied to estimate the 3-h rates. Since precipitation monitoring sites in southern Canada were sparse, there were many clusters of grid cells without monitoring sites, especially for the winter months. For these cells, the 3-h precipitation rates were assumed to be equal to those of the nearest cell having at least one monitoring site. The 3-h rates over the Atlantic Ocean and the Gulf of Mexico were estimated using the same technique.

SECTION 3

MODEL APPLICATIONS AND EVALUATIONS

APPLICATIONS

To accomplish its goals, Work Group 2 requested that each of the eight long-range transport models generate the following model output:

- 1) annual 1978 unit transfer matrices of wet sulfur deposition, dry sulfur deposition, ambient SO_2 concentrations, and ambient SO_4 concentrations normalized by a 1.0 Tg S yr^{-1} emission rate from each of the 40 source/receptor regions and 9 sensitive receptors defined by Work Group 2, and
- 2) January, July and annual 1978 wet sulfur depositions and average ambient SO_4 concentrations at monitoring sites selected by Work Group 2.

The unit transfer matrices, although strongly influenced by the meteorological scenarios used in the simulation period, were to be used by another work group to assess the merits of several emission scenarios. From these transfer matrices, the effects of emissions from individual regions on the sulfur depositions and ambient concentrations across the nine sensitive receptor areas (Figure 3) and the 40 source/receptor regions (Figure 4) could be determined. However, before any conclusions are drawn, one should be aware of the caveats associated with the matrices (U.S./Canadian Work Group 2 Final Report, 1983; U.S./Canadian Regional Modeling Subgroup Final Report, 1983).

The January and July 1978 meteorological data used to generate the transfer matrices were analyzed and gridded by preprocessors as described in the previous section. The emissions from each grid cell within a given source/ receptor region were multiplied by a constant factor so that the total annual sulfur emissions from that region equaled 1.0 Tg .

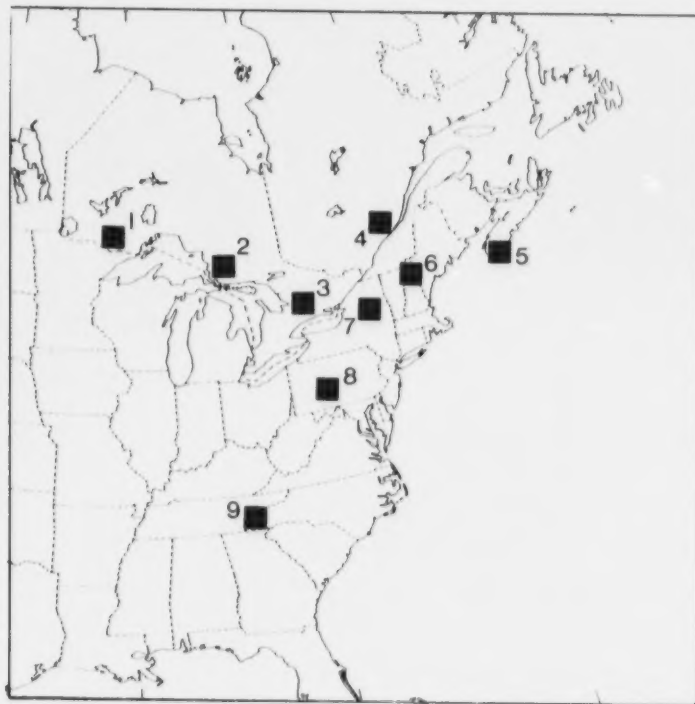


Figure 3. The 9 sensitive areas of North America as designated by Work Group 2.

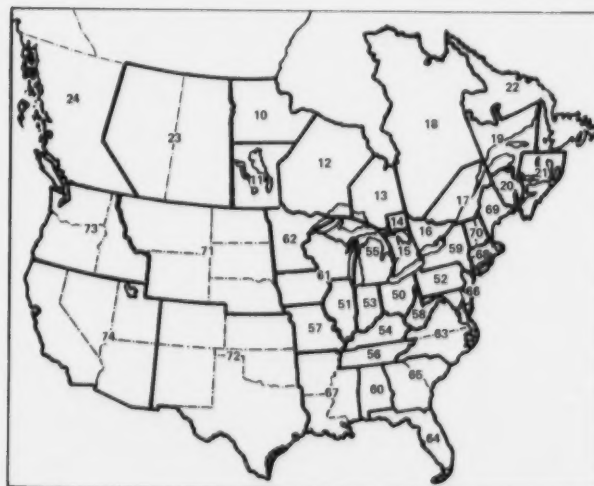


Figure 4. The 40 source/receptor regions of North America as designated by Work Group 2.

Since the meteorological data and analyses for the entire year of 1978 were unobtainable in the rather brief time frame imposed upon the work group, it was agreed that ENAMAP-1 would be applied using only January and July 1978 input data. Annual estimates of the transfer matrices would be based only on matrices for those two months. In addition, since the ENAMAP-1 domain did not include western North America, only 35 instead of 40 source/receptor regions were considered.

The ENAMAP-1 January and July 1978 unit transfer matrices are presented in the appendices in two forms. In Appendix A, the complete unit transfer matrices relate the impact of 1.0 Tg S yr^{-1} emitted by each of the 35 regions on the sulfur depositions and ambient sulfur concentrations in that region. The unit transfer matrices in Appendix B relate the impact of 1.0 Tg S yr^{-1} emitted from 11 consolidated regions on the sulfur wet depositions and ambient SO_4 concentrations in the 9 sensitive receptor areas. For all sets of transfer matrices, the regional distribution of emissions was preserved.

The transfer matrices indicated that the sources within any 1 of the 35 regions contributed significantly to the sulfur depositions and concentrations within that region. In January, on the average, 68% of SO_2 wet deposition in a particular region was a direct result of SO_2 emissions from that region. Similarly, in July, an average of 64% of the SO_2 wet deposition in a particular region resulted from SO_2 emissions from that region. Since the ENAMAP-1 results indicated that much of the sulfur wet deposition consisted of SO_2 wet deposition (in some cases, wet deposition of SO_2 was an order of magnitude greater than that of SO_4), the model indicated that local sources have a very significant role in sulfur wet deposition.

EVALUATION

An ideal assessment of the performance of any regional sulfur model would require an extensive data base of dry sulfur depositions, wet sulfur

depositions, and ambient SO_2 and SO_4 concentrations measured during all seasons of the year across all portions of the modeling domain that are removed from the effects of local sources. Unfortunately, such a data base does not exist. However, daily average concentrations of SO_2 and SO_4 from 1 Canadian and 53 U.S. sites were available from the Electric Power Research Institute's Sulfur Regional Experiment (EPRI-SURE). Monthly sulfur wet deposition data for these periods were available from several Multistate Atmosphere Power Production Pollution Study (MAP3S) sites in the northeastern U.S. and from about a dozen Canadian Network for Sampling Precipitation (CANSAP) sites. Together, these data formed the best available regional sulfur modeling evaluation data base.

Work Group 2 screened the data on ambient SO_4 and sulfur wet deposition for January and July 1978. For the MAP3S network, precipitation samples with a catch of less than 50% of a nearby rain gauge measurement were ignored. Otherwise, the precipitation sample amount was adjusted to the rain gauge measurement. Valid monthly samples required a minimum 90% capture. For CANSAP, 7 of the 16 operational sites were ignored because of operational or siting problems. Valid monthly samples required a minimum operational time of 20 and a minimum collection efficiency of 25%. Collection efficiency was defined as the ratio (%) of the precipitation recorded by the sampler to that measured by a colocated rain gauge. Since even rain gauges do not collect all of the precipitation (precipitation collection efficiency is a function of gauge type, site exposure, and wind velocity); the rain gauge precipitation data from both networks were adjusted by Peck (1982).

The SO_2 emission data used in the evaluation study were obtained from several sources, since a complete 1978 emission inventory was not available. Because much of the SO_2 was emitted from electric power plants, it was imperative to accurately define the 1978 power plant emissions. With this in mind, Environment Canada prepared a 1978 SO_2 emission inventory for large point sources. Emissions from all other sources were assumed to be the same as in 1976. The 1978 SO_2 emissions from the U.S. power plants

were estimated from fuel use records, while the 1978 emissions from all other sources were assumed to be the same as in 1980, the year for which emissions data were available.

Table 2 lists the total SO₂ emissions from the 35 regions used in this study. These annual rates were used by the other modelers of Work Group 2 as well. To aggregate the total state/province emissions to a useable grid network, the modelers used an emission inventory for the states/provinces that had been developed earlier by Brookhaven National Laboratory.

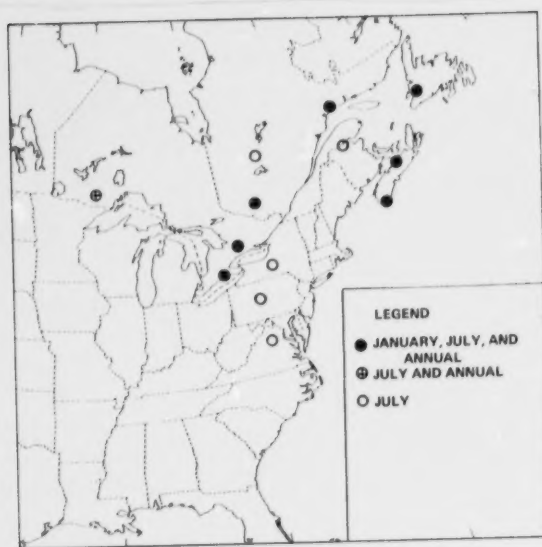
The emission data set was more precise than the precipitation data set. Due to the lack of extensive precipitation measurements in Canada in the winter, the 3-h precipitation amounts used in the ENAMAP-1 applications were extrapolated for much of the Canadian portion of the grid domain. In comparison to the data from the U.S. precipitation chemistry sites, the amounts measured at the Canadian sites showed less agreement with the monthly ENAMAP-1 precipitation amounts across the grid cells encompassing each site.

Because of the high spatial variability of precipitation, especially in the summer, the precipitation at two nearby sites can be significantly different over any time period. Since most Work Group 2 long-range transport models assumed a constant precipitation rate across each grid cell, it is sometimes frivolous to compare model-calculated sulfur wet depositions over a rather large area to those measured at a single point.

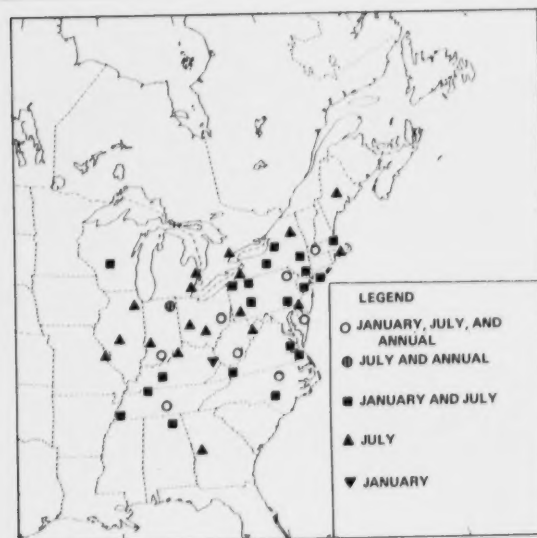
The monthly total sulfur wet depositions and the monthly average ambient SO₄ concentrations calculated for grid cells encompassing monitoring sites are compared to observations in Table 3. Missing data are indicated by the blanks. The site locations are identified in Figure 5. No attempt was made to compare the observations to interpolated values from the ENAMAP-1 output fields.

TABLE 2. ESTIMATED 1978 SO₂ EMISSIONS FOR THE 35
REGIONS WITHIN THE ENAMAP-1 DOMAIN
(U.S./Canadian Work Group 2, 1982)

Region number	State/province	Total SO ₂ emissions (10 ⁶ kg yr ⁻¹)
11	Southern Manitoba	505.0
12	Northwestern Ontario	17.9
13	Northeastern Ontario	183.9
14	Sudbury, Ontario	689.1
15	Southwestern Ontario	667.6
16	Southeastern Ontario	51.5
17	Southern Quebec	454.6
18	Northern Quebec	539.6
19	Gaspe Bay, Quebec	79.3
20	New Brunswick	191.5
21	Prince Edward Island/Nova Scotia	169.9
22	Newfoundland/Labrador	59.5
50	Ohio	2778.9
51	Illinois	1557.4
52	Pennsylvania	1973.4
53	Indiana	1225.2
54	Kentucky	1085.5
55	Michigan	1059.7
56	Tennessee	1075.4
57	Missouri	1107.6
58	West Virginia	946.6
59	New York	1007.4
60	Alabama	655.2
61	Wisconsin/Iowa	907.6
62	Minnesota	279.8
63	Virginia/North Carolina	875.9
64	Florida	728.2
65	Georgia/South Carolina	919.1
66	Maryland/Delaware/New Jersey/District of Columbia	760.5
67	Arkansas/Louisiana/Mississippi	617.6
68	Massachusetts/Connecticut/Rhode Island	575.2
69	Maine	82.3
70	Vermont/New Hampshire	86.9
71	Nebraska/North Dakota/South Dakota/ Montana/Wyoming	581.3
72	Oklahoma/Kansas/Colorado/New Mexico/Texas	1698.1



(A)



(B)

Figure 5. The location of the sulfur wet deposition sites (A) and the ambient SO_4 monitoring sites (B) included in Table 3.

Table 3 presents calculations from two different ENAMAP-1 applications; each application used a different value for the puff truncation (i.e., the deletion of a puff of pollution when the masses of SO_2 and SO_4^- both fall below user-specified values). The first application used a value of 10^{-2} kton; the results of this application were transmitted to the work group. Later, the sensitivity study showed that this puff truncation value ignored small sources of SO_2 . Therefore, in the subsequent application, a truncation value of 10^{-4} kton was used. A significant increase in the computation time resulted. The two sets of ENAMAP-1 results in Table 3, therefore, provide an assessment of the role of the minor sources of SO_2 on sulfur wet depositions and ambient SO_4^- concentrations in the U.S. and Canada.

TABLE 3. MODELED AND MEASURED MONTHLY TOTAL SULFUR WET DEPOSITIONS AND MONTHLY AVERAGE AMBIENT SO_4^- CONCENTRATIONS USING TWO DIFFERENT PUFF TRUNCATION VALUES (10^{-2} AND 10^{-4} KTON)

Site	Total sulfur wet deposition (kg ha^{-1})					
	January 1978			July 1978		
	Modeled 10^{-2}	Modeled 10^{-4}	Observed	Modeled 10^{-2}	Modeled 10^{-4}	Observed
Shelburne, NS	0.03	0.10	0.40	0.08	0.15	0.10
Peterborough, ON	0.54	0.69	0.60	0.79	1.05	1.70
Simcoe, ON	2.97	3.23	2.80	1.20	1.43	1.20
Sept Isles, PQ	0.18	0.28	0.20	0.06	0.19	1.00
Maniwaki, PQ	0.42	0.68	0.20	0.58	0.86	1.20
Atikokan, ON				0.01	0.12	0.40
Charlo, NB				0.18	0.40	1.00
Chibougamau, PQ				0.19	0.21	1.00
Ithaca, NY				1.78	2.25	1.60
State College, PA				1.55	1.92	2.40
Charlottesville, VA				0.69	0.96	1.60
Average	0.83	1.00	0.84	0.65	0.87	1.20

TABLE 3. (CONTINUED)

Site	Average ambient SO_2 concentration ($\mu\text{g m}^{-3}$)					
	January 1978			July 1978		
	Modeled 10 ⁻²	Modeled 10 ⁻⁴	Observed	Modeled 10 ⁻²	Modeled 10 ⁻⁴	Observed
Montague, MA	4.2	4.9	3.6	9.3	13.7	9.3
Scranton, PA	5.4	6.3	5.4	15.2	21.2	12.8
Indian River, DE	6.9	7.4	5.5	8.7	13.0	9.5
Duncan Falls, OH	4.2	5.0	8.8	10.3	14.8	16.9
Rockport, IN	4.8	6.3	8.1	4.4	5.8	13.8
Giles Co., TN	6.4	7.4	6.9	5.6	7.3	11.6
Fort Wayne, IN				4.6	7.4	11.2
Chapel Hill, NC	7.4	8.1	5.5	5.7	10.2	8.9
Lewisburg, WV	6.3	6.7	6.7	10.1	14.6	11.5
Beverly, MA	3.4	3.8	6.1	5.8	9.3	9.6
Fall River, MA				5.1	8.6	8.0
Albany, NY	4.0	4.7	6.0	11.7	17.0	11.0
Oswego, NY	5.1	6.1	3.9	12.4	18.7	11.8
Dunkirk, NY				11.0	15.9	15.8
Roseton, NY	4.7	5.6	6.1	8.9	12.7	12.3
Warren, PA	4.4	5.1	7.6	10.9	16.0	15.4
Louisville, PA				11.6	15.5	16.3
Brush Valley, PA	4.8	5.3	6.7	14.6	18.9	16.4
Wilmington, DE				9.6	14.6	15.5
Madison, KY				6.5	8.9	12.8
Louisa, KY	6.9	7.6	8.8			
Sullivan, IN				4.5	6.6	12.0
Detroit, MI				9.1	13.6	8.8
Port Huron, MI				8.4	13.2	8.8
Springfield, IL				3.0	4.2	14.9
Braidwood, IL				5.2	9.3	10.0
Columbus, OH				11.1	15.2	14.5
Conneaut, PA	4.4	4.9	7.4	9.6	13.5	13.2
Toronto, ON				11.1	15.8	11.8
Huntington, NY	6.0	6.7	4.5	7.4	11.4	9.5
Loves Mill, TN	6.3	6.9	7.1	6.5	10.2	15.1
Hytap, AL	7.0	7.9	10.3	4.9	6.3	11.5
L-B-L, TN	7.0	8.0	8.1	6.4	7.6	9.2
Paradise, KY	5.4	6.6	9.1	4.5	5.6	11.8
Memphis, TN	6.6	8.3	9.2	1.7	2.8	9.9
St. Louis, MO				4.2	5.4	12.8
Nekoosa, WI	0.4	1.0	4.5	0.8	2.7	5.9
Ithaca, NY	5.5	6.8	5.4	13.8	20.3	10.9
Dayton, OH				8.8	12.3	13.7
Mt. Storm, WV				13.2	17.5	15.9
Chesterfield, VA	6.4	7.1	6.2	6.6	10.9	10.8
Yorktown, VA	6.3	7.1	6.7	6.4	10.6	8.3

TABLE 3. (CONTINUED)

Site	Average ambient SO ₄ concentration ($\mu\text{g m}^{-3}$)					
	January 1978			July 1978		
	Modeled 10-2	10-4	Observed	Modeled 10-2	10-4	Observed
Weatherspoon, NC	7.5	8.4	6.9	3.6	7.5	6.4
Atlanta, GA				2.7	3.8	9.6
Chester, NJ	5.9	6.6	7.0	9.4	14.0	12.7
Whiteface Mt., NY				10.4	16.0	7.0
York, PA	5.9	6.6	9.4	15.3	20.7	11.0
Kentshill, ME				8.9	14.1	7.5
Average	5.5	6.3	6.8	8.1	11.8	11.6

Realizing that the measured data set was inadequate for concrete conclusions and unsure of the best method to statistically assess model performance, Work Group 2 decided to compute the values of selected statistical parameters to assess the performance of the models for January, July, and annual 1978. Models that were applied to only the two months were not evaluated for the annual period. This model evaluation exercise was expected to at least identify models that consistently performed below an acceptable level.

Table 4 presents the values of the statistical parameters calculated for the ENAMAP-1 results. The residuals were determined by subtracting the calculated value from the observed value. In general, a model is said to overpredict the observations when the mean residual is less than zero. For a "good" model, the correlation between the residual and the calculation is low in magnitude. This parameter is a good measure of a model's ability to correctly calculate the higher and lower observed values.

It is difficult to state firmly that the model performed better for ambient SO₄ concentrations than for total sulfur wet deposition. Based on the correlation of the residual and calculation, the model performed best for July sulfur wet deposition and January ambient SO₄ concentrations. Furthermore, the values of the mean residuals were comparable.

TABLE 4. VALUES OF STATISTICAL PARAMETERS CALCULATED FOR THE ENAMAP-1 RESULTS USING THE DIFFERENT PUFF TRUNCATION VALUES (KTON)

Parameter	Total sulfur wet deposition (kg ha^{-1})			
	January 1978		July 1978	
	10 ⁻²	10 ⁻⁴	10 ⁻²	10 ⁻⁴
Sample size	5		11	
Mean of observation	0.84		1.20	
Mean of calculation	0.83	1.00	0.65	0.87
Mean residual	0.01	-0.16	0.55	0.33
Standard deviation of residual	0.23	0.31	0.42	0.46
Correlation of residual and calculation	-0.32	-0.62	0.44	0.18
Average ambient SO_2 concentration ($\mu\text{g m}^{-3}$)				
	January 1978		July 1978	
	10 ⁻²	10 ⁻⁴	10 ⁻²	10 ⁻⁴
Sample size	29		47	
Mean of observation	6.8		11.6	
Mean of calculation	5.5	6.3	8.1	11.8
Mean residual	1.3	0.5	3.5	-0.2
Standard deviation of residual	1.9	1.8	3.6	4.9
Correlation of residual and calculation	0.46	0.14	0.44	-0.36

It was observed that the 10⁻⁴ kton puff truncation value improved the concentration calculations, but degraded the deposition calculations. The mean concentration and deposition calculations became closer to the mean observations, with the exception of the January depositions. There were significant decreases in the mean residuals for the January and July concentrations and the July depositions. The major reason for the significant increase in the absolute value of the mean residual for the January deposition was the greater overprediction of the 2.80 kg ha^{-1} observation. Significant decreases also were noted in the correlations between the residuals and the calculations for the January concentrations and the July depositions.

SECTION 4

MODEL SENSITIVITY STUDY

DESIGN

Every numerical simulation model produces results that do not concur exactly with observations. These discrepancies are due partially to uncertainties in the values of model input parameters (e.g., dry deposition rates, scavenging coefficients, mixing heights, transformation rates, etc.). Atmospheric scientists cannot reach a consensus on a single appropriate value for each of these model input parameters, but a consensus can be reached on a general range of "acceptable" values.

Since there are many "acceptable" values, the modeler is faced with the problem of selecting one value to use in model applications. The magnitude of this problem is proportional to the model sensitivity, or the degree of observed change in the model calculation from a unit change in the model input value. If the model proves sensitive to a certain model input parameter, the modeler must carefully select the value of that parameter. A model sensitivity study identifies those model input parameters whose values must be chosen carefully.

In a sensitivity study, the model is applied many times; the value of one of the model input parameters is changed each time, and the resultant changes in model output are examined. Typically, this involves the consumption of considerable computer time. To minimize this expense, this sensitivity study used an abbreviated version of ENAMAP-1 and only 3 values of each of the 15 model input parameters (Table 5). Two of the three values represented the low and high values of the "acceptable" range of each parameter, while the third value (base case) was the value used in past ENAMAP-1 applications.

TABLE 5. MODEL INPUT PARAMETER VALUES CONSIDERED IN THE SENSITIVITY STUDY

Parameter code	Parameter	Case 1	Base case	Case 2
TIME INC	Computational time step (h)	1.0	3.0	2.0
WINDSPD	Wind speed (km h ⁻¹)	8.1	24.2	40.3
PRCP RT	Precipitation rate (mm h ⁻¹)	0.05	0.10	0.15
EXPN RT	Puff expansion rate (km ² h ⁻¹)	29.0	36.0	42.0
TRAN RT	Transformation rate (% h ⁻¹)	0.50	1.00	1.50
MIX HT	Mixing height (km)	1.00	1.45	1.90
EMISCELL	Initial puff size (km)*	60.0	70.0	80.0
WETDSO2	SO ₂ wet deposition rate (5 mm ⁻¹)	10.0	28.0	46.0
WETDSO4	SO ₄ wet deposition rate (% mm ⁻¹)	1.0	7.0	13.0
DRYDSO2	SO ₂ dry deposition factor#	0.67	1.00	2.22
DRYDSO4	SO ₄ deposition factor#	0.167	1.000	1.830
SO2EMIS	SO ₂ emission rate (kton h ⁻¹)	0.29	0.36	0.43
SO4EMIS	SO ₄ emission rate (kton h ⁻¹)	0.018	0.000	0.036
TOPSO2	SO ₂ loss rate from mixed layer top (kton h ⁻¹)	0.005	0.000	0.010
TOPSO4	SO ₄ loss rate from mixed layer top (kton h ⁻¹)	0.005	0.000	0.010

* The initial area of each puff is defined as the area of a square of sides EMISCELL.

The land-use, stability-dependent dry deposition rates are multiplied by these factors.

The abbreviated version of ENAMAP-1 considered 1) only one emission source, which emitted puffs of SO₂ and SO₄ at 12-h increments, 2) a continuous 1.0 mm h⁻¹ precipitation rate, and 3) a uniform transport wind from the southwest. All other parameterizations were preserved, with the exception of the SO₂ and SO₄ dry depositions, which reflected the parameterization used in a version of ENAMAP-1 currently under development. This parameterization is based on atmospheric stability and land-use characteristics.

Since the dry deposition rates depended on land-use type, a geographical region of North America had to be chosen. The region between southern Ohio and eastern Quebec was selected (Figure 6). The Adirondacks sensitive area is located in the middle of this region, 700 km from the source.

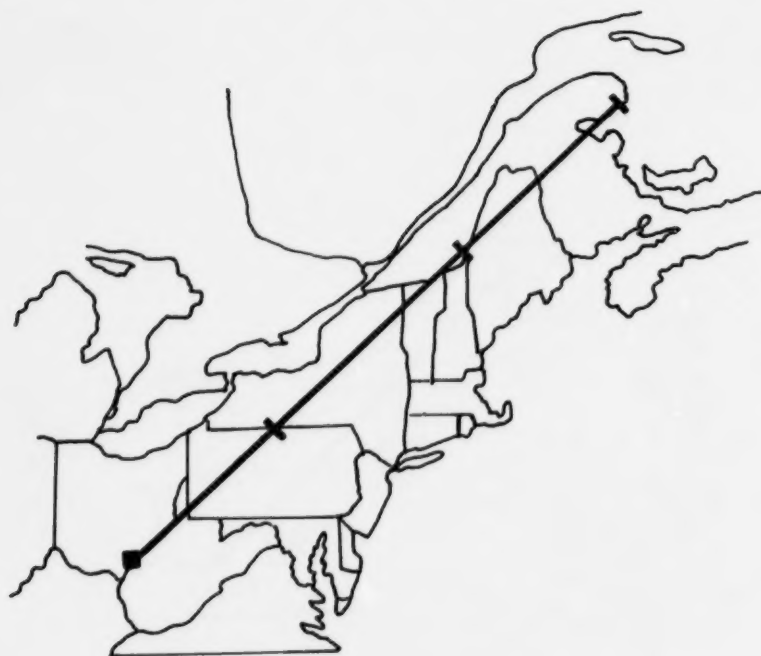


Figure 6. The 1500-km track used for transport of pollutant puffs from southern Ohio in the ENAMAP-1 sensitivity study.

Wet and dry deposition and ambient concentrations of SO_2 and SO_4 were determined for the 70-km grid square containing the source as well as those up to 1800 km downwind of the source. Only the wet depositions and ambient concentrations are discussed below, however. The distance from the center of the grid square containing the source and the center of the receptor square immediately downwind was 99 km. For simplicity, the following discussions assume a distance of 100 km.

RESULTS

Single Parameter Variations

The first parameter examined was TIME INC, the frequency of the deposition and concentration calculations. The model calculates the mass of pollutants removed from each puff, the volume of each puff, and the concentrations within each puff every TIME INC hours. On one hand, this value should be small enough so that depositions and concentrations within the grid squares downwind of the source(s) are not underestimated due to transport of the puffs over the squares before depositions and concentrations within these squares are determined. On the other hand, smaller values entail more frequent calculations of depositions and concentrations, and hence more computer time and expense.

The actual value for this parameter should be chosen on the basis of the maximum expected wind speed. A higher transport wind speed necessitates a lower TIME INC value, to insure a smooth distribution of depositions and concentrations along the puff transport path. As an example, if the transport wind speed is 40 km h^{-1} and TIME INC is 3 h, the center of the puff is transported 120 km across the 70-km receptor grid network before the deposition and concentration calculations are performed. As a result, the model calculates depositions and concentrations in the receptor cell along the puff transport path and between the source and the current location of the puff center that are much lower than those in the receptor cell containing the puff center.

Figure 7 illustrates the SO_2 concentrations ($\mu\text{g m}^{-3}$) at equally spaced distances from the source for three different wind speeds (8.1, 24.2, and 40.3 km h^{-1}) for a TIME INC of 3, 2, and 1 h. All remaining parameters were assigned their base case values. With TIME INC equal to 3 h (as in previous ENAMAP-1 applications), the concentration curve was rather smooth for the low wind speed, erratic for the moderate wind speed, and very erratic for the high wind speed. In the case of the high wind speed, the concentrations downwind of the source periodically approached zero, since the puffs were transported across some of the receptor cells before the calculations were performed.

When the value of TIME INC was lowered to 2 h, the concentration curve for the moderate wind speed case became smooth, but the curve for the high wind speed case was periodically erratic. An improvement in the concentration curve for the high wind speed was noted, however. Instead of periodic occurrences of declines to near zero (as with TIME INC 3h) there were peaks in the concentration curve. This could be a result of the puff center remaining in the same receptor cell for two consecutive calculation time steps.

When TIME INC was decreased to 1 h, the concentration curves for the lowest two wind speeds were unchanged. The amplitude of the perturbations in the concentration curve for the high wind speed decreased, however; the curve became more saw-toothed. The fact that the concentration curve was not smooth even for the 1-h calculation time step does not present a serious problem, since wind speeds of 40 km h^{-1} occur infrequently.

As a result of this investigation, it was decided that a TIME INC value of 2 h would be used in the remainder of the sensitivity study. Except for the low wind speed case, the 2-h calculation time step yielded a significant improvement in the concentration curves over those resulting from the 3-h step. The curves resulting from the 1-h step were not significantly better than those resulting from the 2-h step, therefore, the added expense of doubling the number of computations was not justified.

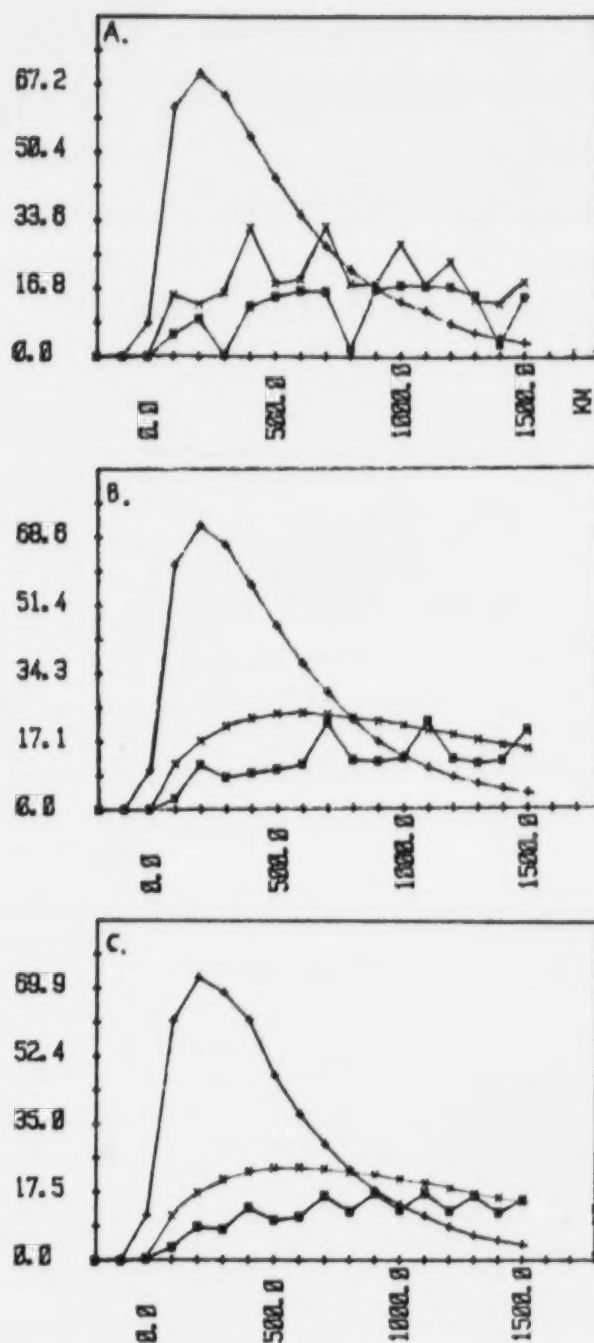


Figure 7. The 96-h average ambient SO_2 concentrations ($\mu\text{g m}^{-3}$) at specific distances upwind and downwind of a single source. Wind speed = 8.1 (+), 24.2 (x), and 40.3 (*) km h^{-1} . TIME INC = 3 (plot A), 2 (plot B), and 1 (plot C) h.

Figures 8a through 8n illustrate the SO_2 and SO_4 wet depositions and concentrations as a function of distance from the source and one of the model input parameters. The order of appearance of the model input parameters in this series of figures matches that of Table 5.

Figure 8a illustrates the four sets of curves resulting from the three different wind speed values. The periodic perturbations noted earlier in the SO_4 concentration curve at the high wind speed also appeared in the curves for SO_2 concentration and SO_2 and SO_4 wet depositions. The location of the peaks in the concentrations was clearly a function of wind speed. At the low wind speed, the magnitude of the peak deposition and concentrations near the source greatly increased, especially for SO_4 .

Changes in model output due to changing the precipitation rate are illustrated in Figure 8b. These changes appeared to be linear for the concentrations, but not for the depositions. The increase in wet deposition per 0.50 mm h^{-1} increase in the precipitation rate appeared to lessen. The amount of SO_4 wet deposited 500 km from the source increased 65% when the precipitation rate was doubled, but the amount wet deposited over the same receptor cell doubled when the precipitation rate was tripled. As the precipitation rate increased, more SO_2 and SO_4 was deposited closer to the source, which left less SO_2 in the puff to transform to SO_4 and less SO_4 to be transported downwind. The wet deposition of SO_2 and SO_4 in a constant light rain scenario dropped significantly beyond 500 km.

Regarding SO_2 and SO_4 concentrations, the location of the peak of the former was not a function of the precipitation rate, while that of the latter was. The peak SO_4 concentration occurred closer to the source as the precipitation rate increased (800 km from the source for 0.05 mm h^{-1} , 600 km for 0.10 mm h^{-1} , and 400 km for 0.15 mm h^{-1}).

Figure 8c illustrates the changes in model output when the puff expansion rate was decreased and increased by 20% of the base case value of $36.0 \text{ km}^2 \text{ h}^{-1}$. Very little change was noted in the deposition and concentration curves.

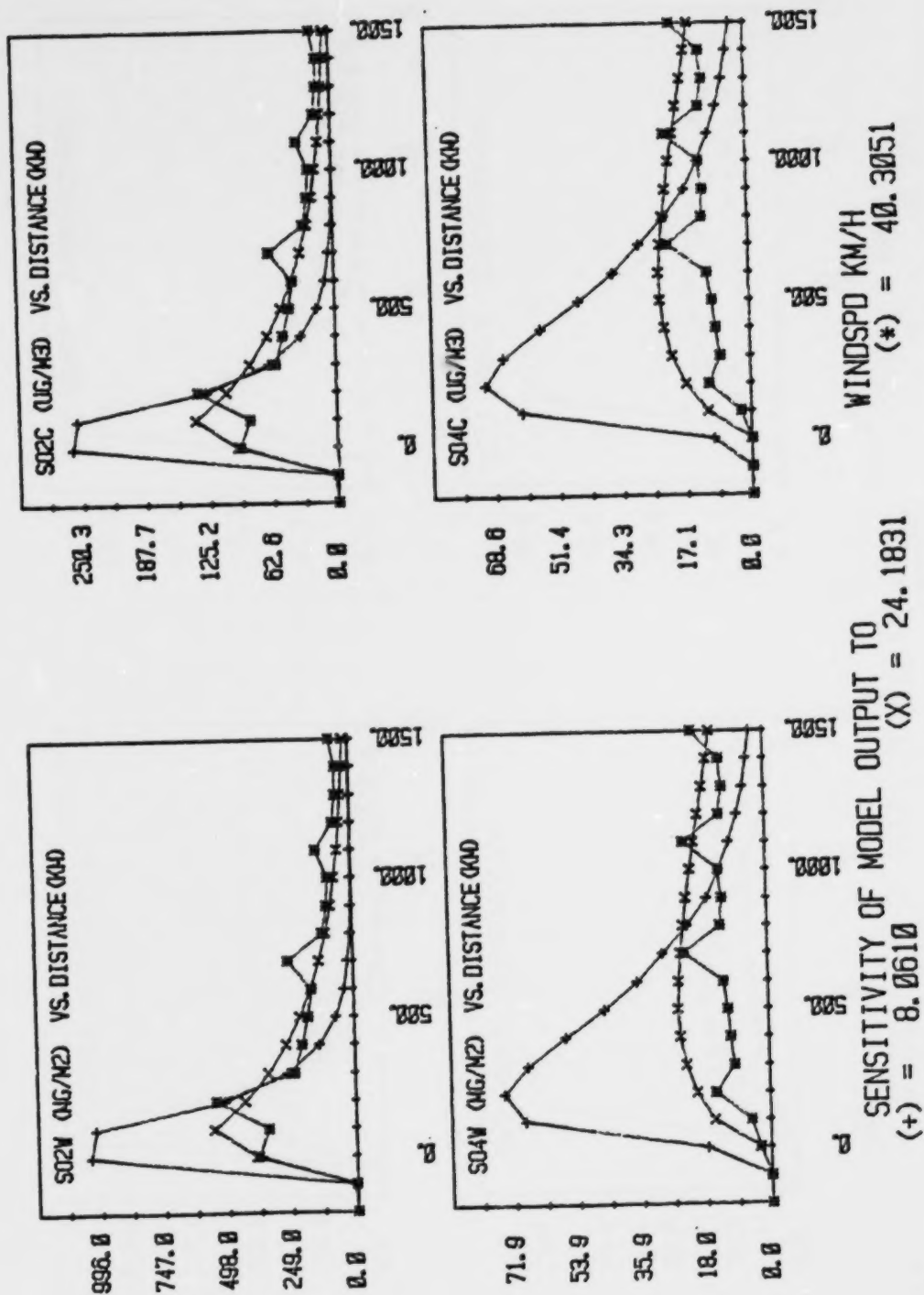


Figure 8a. Wet depositions (mg m^{-2}) and concentrations ($\mu\text{g m}^{-3}$) of SO_2 and SO_4 as a function of wind speed (km h^{-1}) distance (km) downwind of the source.

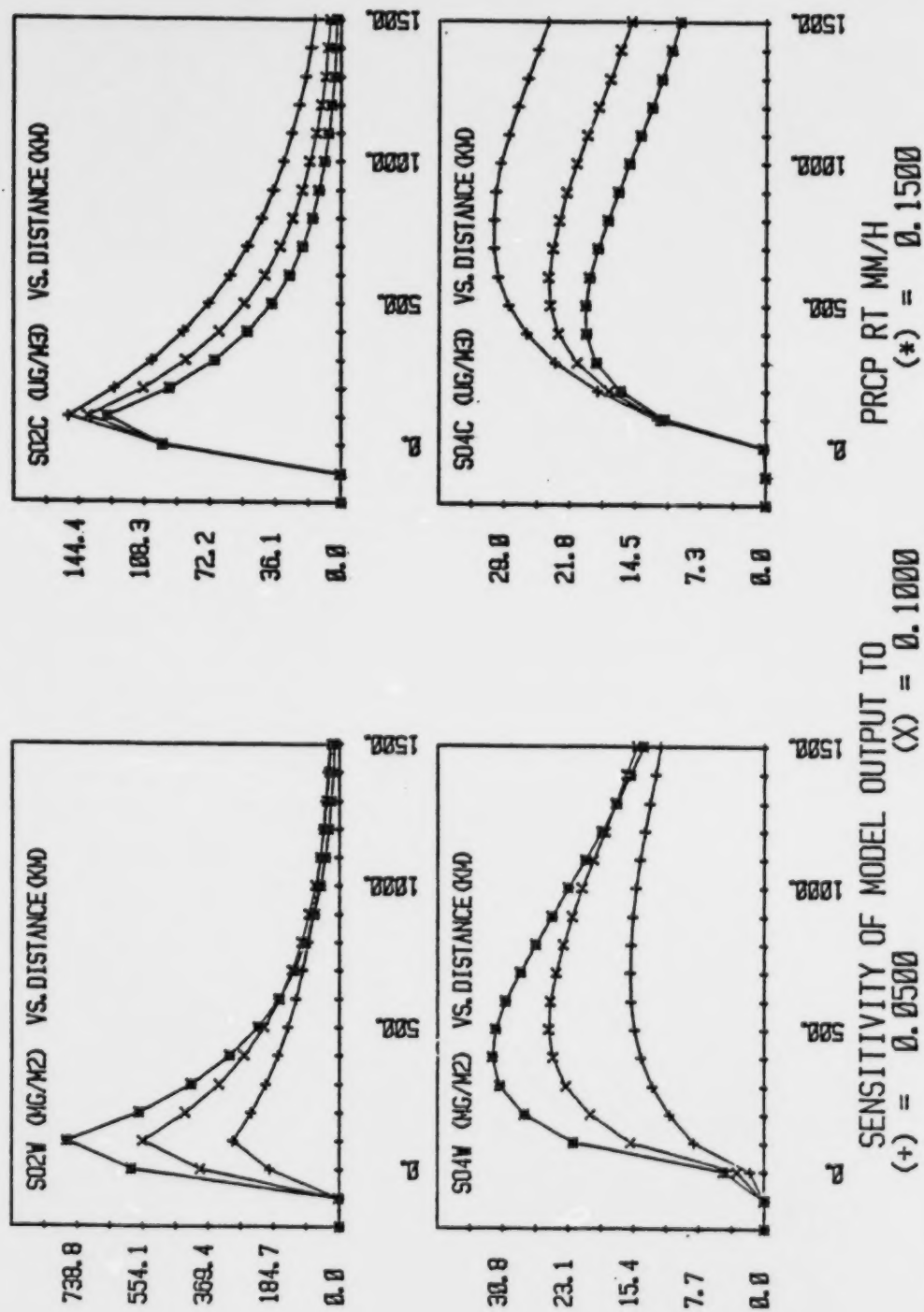


Figure 8b. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of precipitation rate (mm h^{-1}) and distance (km) downwind of the source.

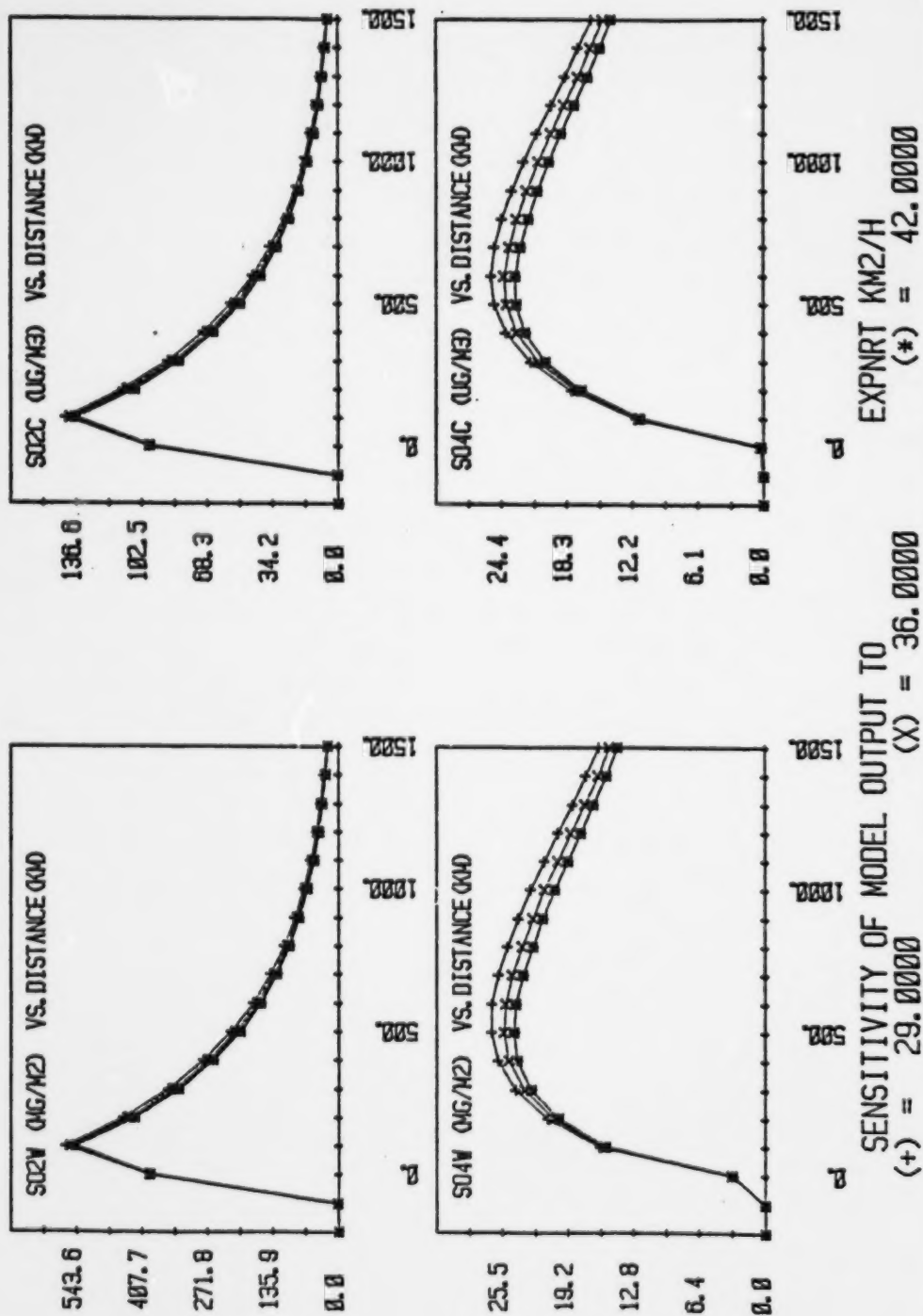


Figure 8c. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of puff expansion rate (km h^{-1}) and distance (km) downwind of the source.

Figure 8d illustrates the changes in model output when the transformation rate of SO_2 to SO_4 was decreased and increased by 50% of its base case value of $1.0\% \text{ h}^{-1}$. For SO_4 wet deposition and concentration, the difference between the base case and high transformation rate case was slightly less than that between the base case and the low transformation case. However, the SO_2 wet deposition and concentration exhibited less of a difference, percentage wise. The downwind location of neither the maximum SO_4 concentration nor the maximum SO_4 wet deposition was a function of the transformation rate.

Changes in model output as a result of changing the mixing height are illustrated in Figure 8e. Increasing the mixing height increased the volume, but not the mass, of the puff. Since depositions were not a function of puff volume, no changes in the depositions were observed. The concentrations, naturally, decreased proportionally with increased in mixing height. A twofold increase in mixing height yielded a twofold decrease in concentrations.

Changes in model output as a result of a 10-km decrease and increase in the value of EMISCELL are illustrated in Figure 8f. The value of this model input parameter determined the initial cross-sectional area of the puff, which was equal to the area of a square of sides EMISCELL. Increases in EMISCELL caused slight linear decreases in the depositions and concentrations.

Figure 8g illustrates the changes in model output as the SO_2 wet deposition rate was decreased and increased by approximately 65% of the base case value of $28.0\% \text{ mm}^{-1}$. As one would expect, the SO_2 and SO_4 depositions and concentrations decreased as the rate increased. Once again, the changes in model output as the input parameter value increased from the base case value were smaller than those resulting from an equal decrease in the input value.

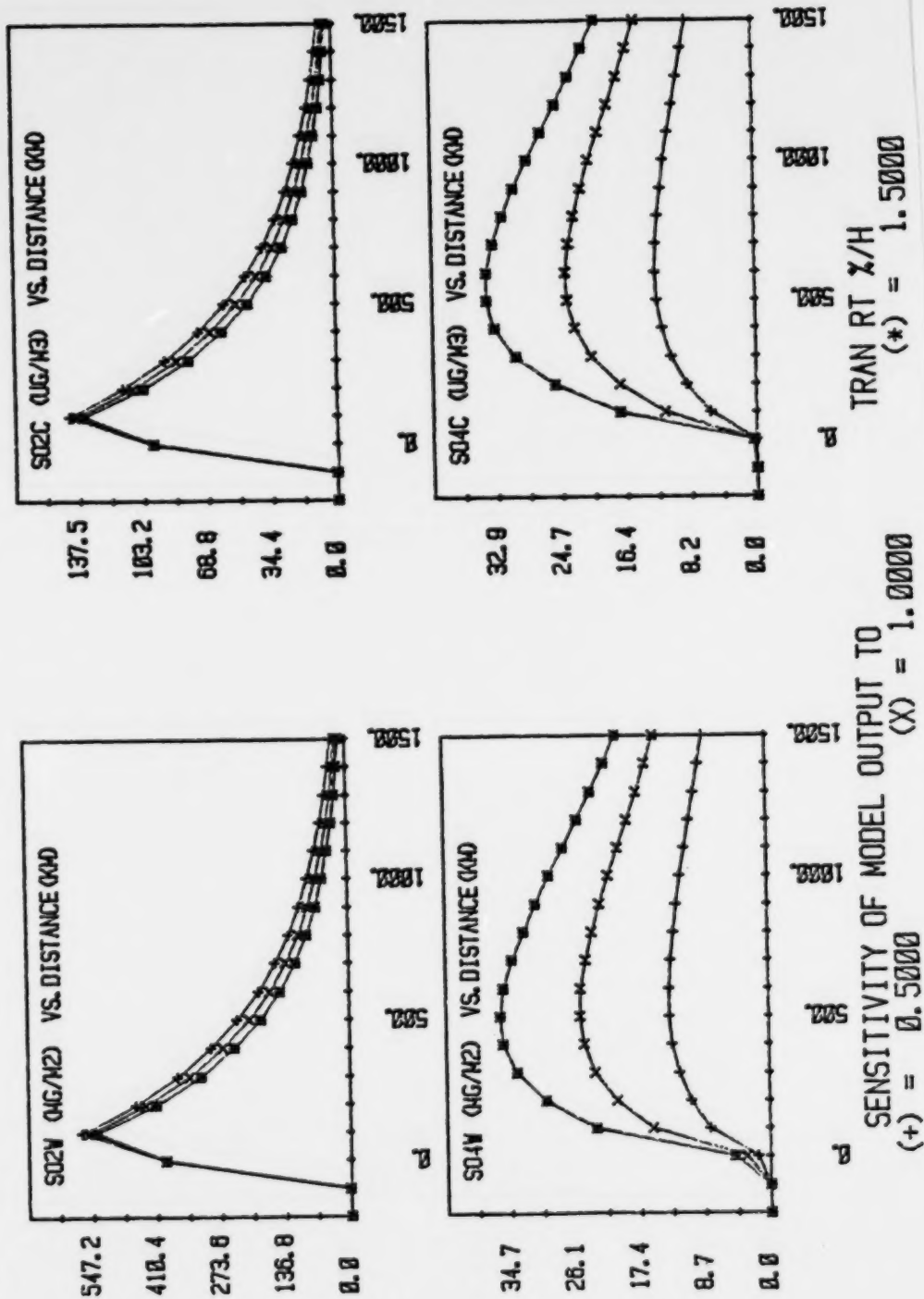


Figure 8d. Wet depositions ($mg\ m^{-2}$) and concentrations ($mg\ m^{-3}$) of SO_2 and S_{04} as a function of transformation rate ($\% h^{-1}$) and distance (km) downwind of the source.

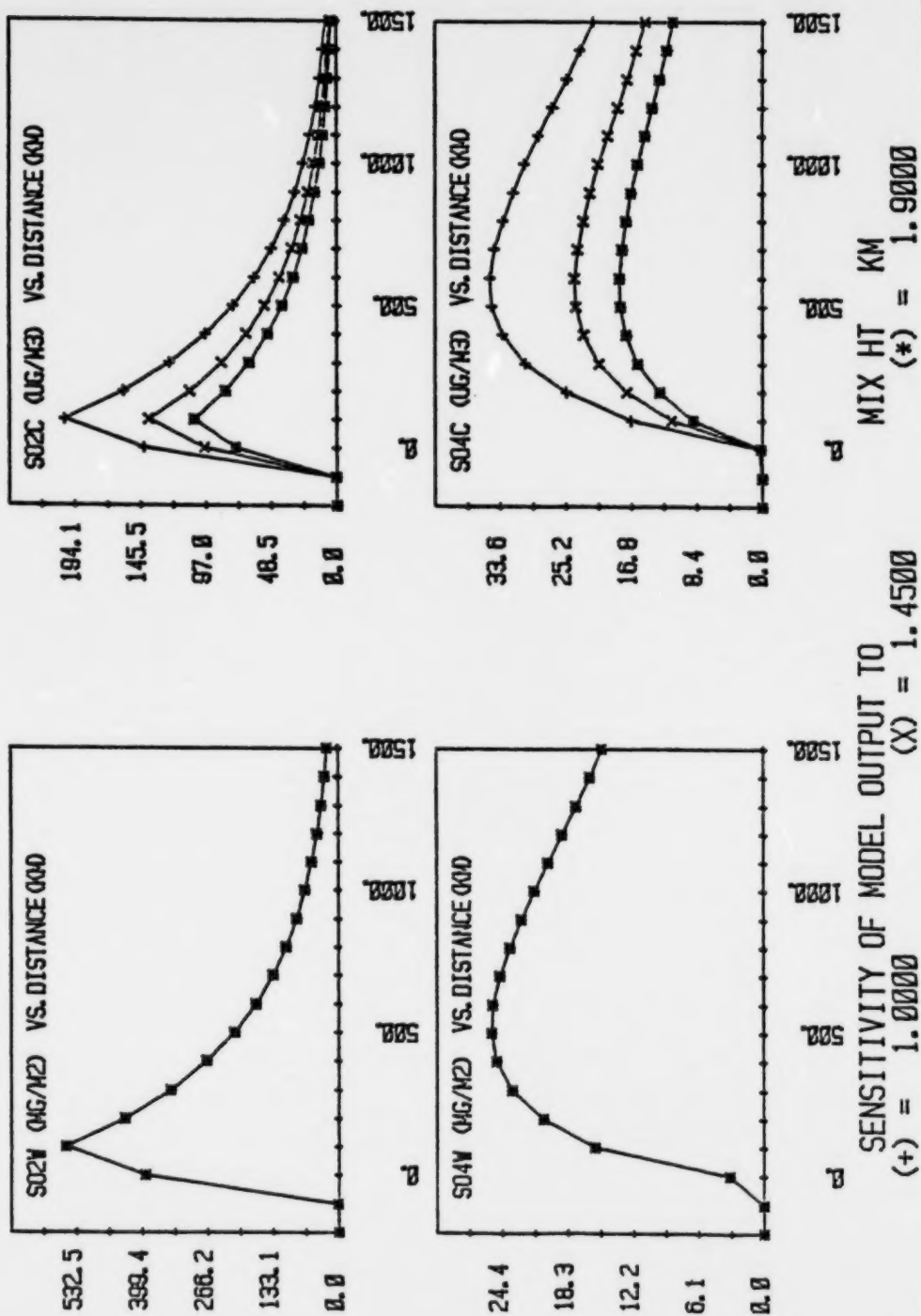


Figure 8e. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of mixing height (km) and distance (km) downwind of the source.

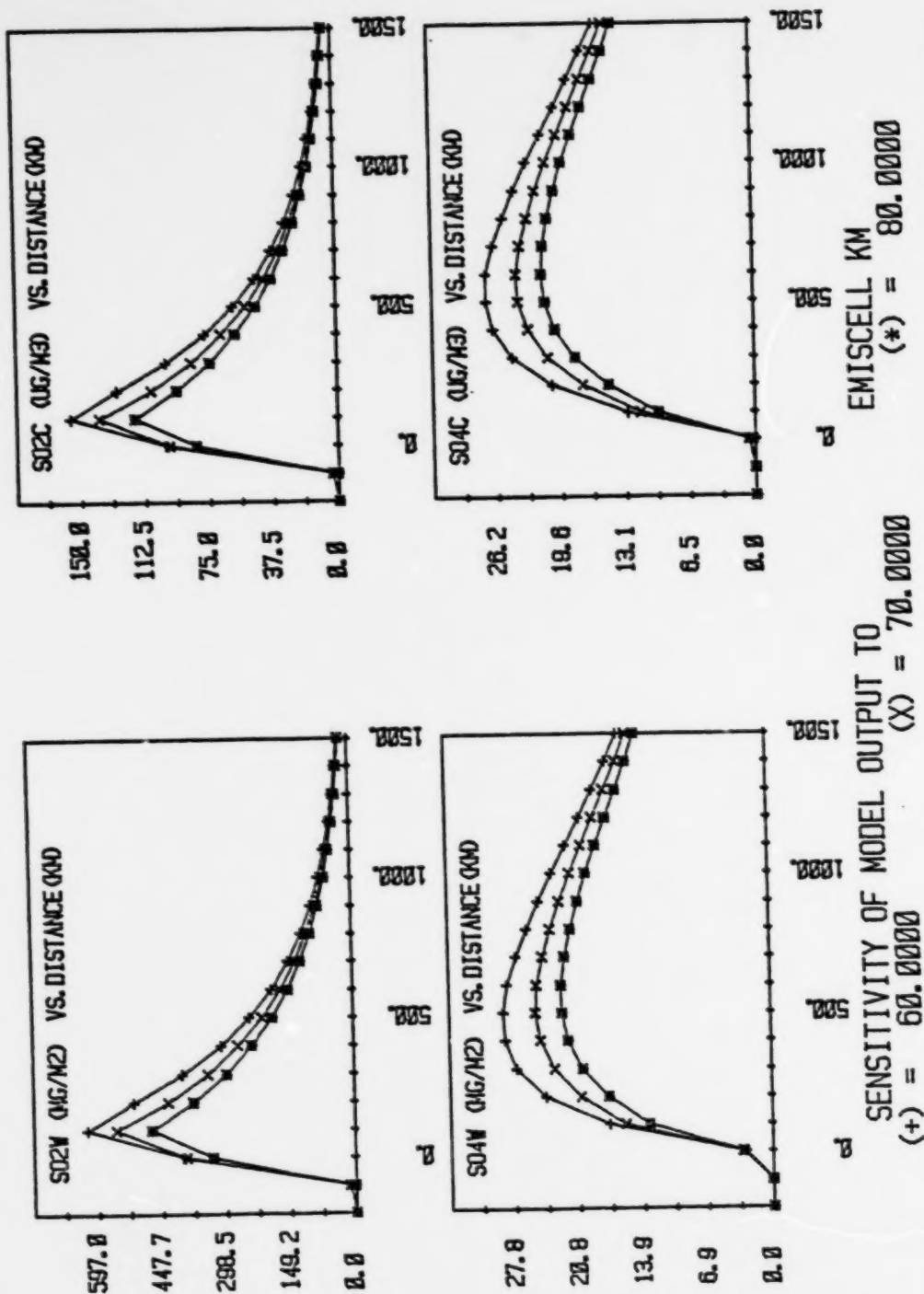


Figure 8f. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of initial puff size (km) and distance (km) downwind of the source.

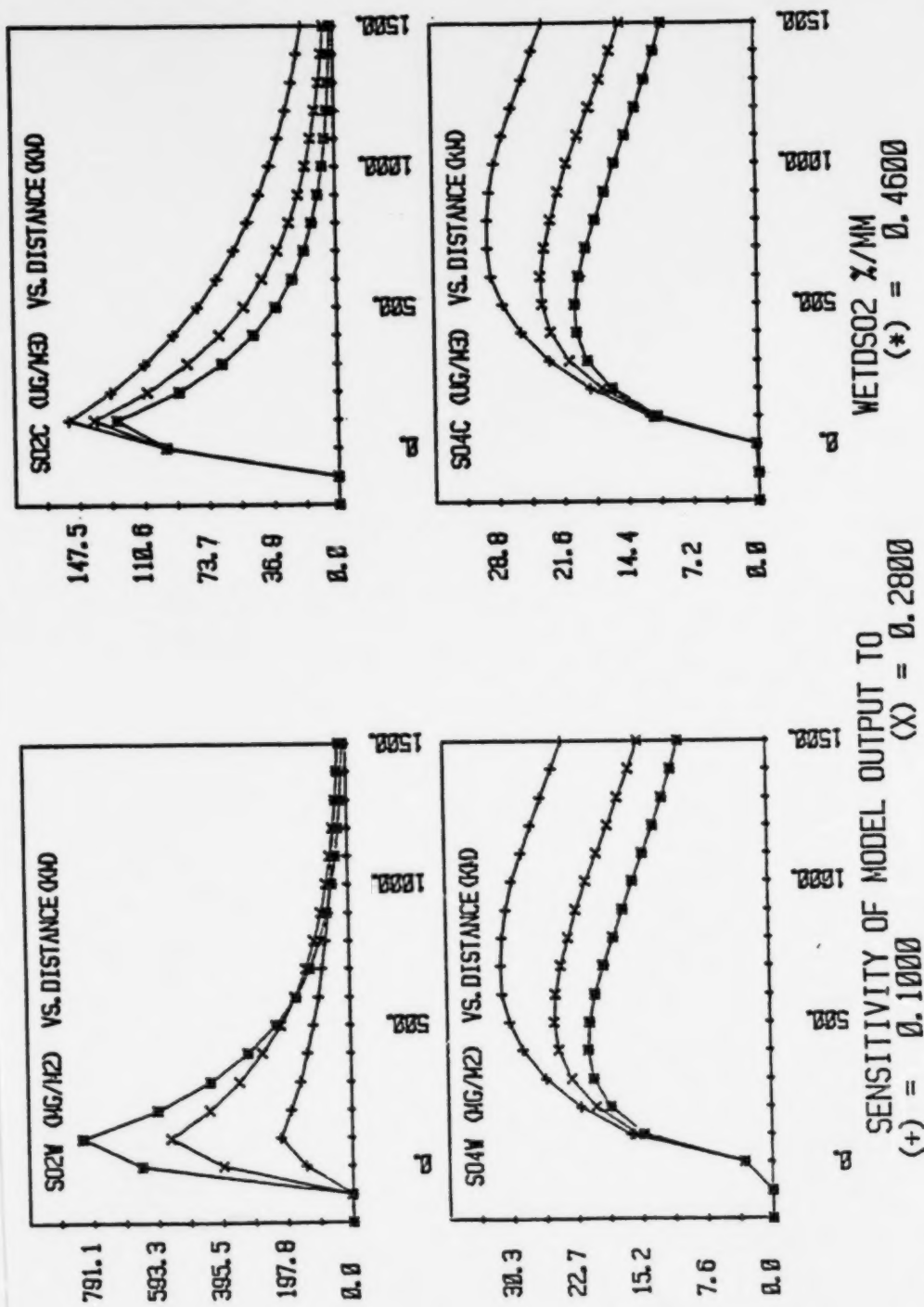


Figure 8g. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_2 wet deposition rate ($\% \text{ mm}^{-1}$) and distance (km) downwind of the source.

The effects of changing the $\text{SO}_4^{=}$ wet deposition rate by approximately 90% of its $7.0\% \text{ mm}^{-1}$ base case value are illustrated in Figure 8h. Naturally, the changes in this model input parameter did not affect the SO_2 concentrations and depositions. For the lowest wet deposition rate, the amount of $\text{SO}_4^{=}$ deposited in each receptor cell downwind of the source was small and nearly uniform. In this case, the decreasing $\text{SO}_4^{=}$ concentrations downwind of the location of the concentration peak were due primarily to the dispersion and dry deposition. The more this input parameter value increased, the more the amplitude of the peak increased in the wet deposition curve. The peak did not shift further downwind as the wet deposition rate increased, however.

Figures 8i and 8j illustrate the changes in model output resulting from changing the SO_2 and $\text{SO}_4^{=}$ dry deposition factors, respectively. The dry deposition rates assigned to each receptor cell, according to the defined predominant land-use type within the cell, were multiplied by the respective factor. Typical dry deposition rates of SO_2 and $\text{SO}_4^{=}$ across the chosen geographical region were about 0.5 and 0.9 cm s^{-1} , respectively.

Since the factors equaled 1.0 in the base case, the dry deposition rates currently used in ENAMAP-1 were designated as the base case. The lowest value of the SO_2 dry deposition factor is much closer to the base case value of 1.0 than is the higher value, since the SO_2 dry deposition rates used in ENAMAP-1 are closer to the lower end of the range of rates reported in the literature.

For the highest value of the SO_2 dry deposition factor (2.22 times the base case), the SO_2 and $\text{SO}_4^{=}$ wet depositions and concentrations decreased only slightly (up to 10%) within 400 km of the source, but decreased to a greater extent (up to 20%) beyond this distance. Such was not the case for the $\text{SO}_4^{=}$ dry deposition factor. Of course, this model input parameter had no bearing on SO_2 depositions and concentrations, but the changes in the $\text{SO}_4^{=}$ wet depositions and concentrations within 400 km of the source, after the $\text{SO}_4^{=}$ dry deposition factor was raised to 1.80, were greater, percen-

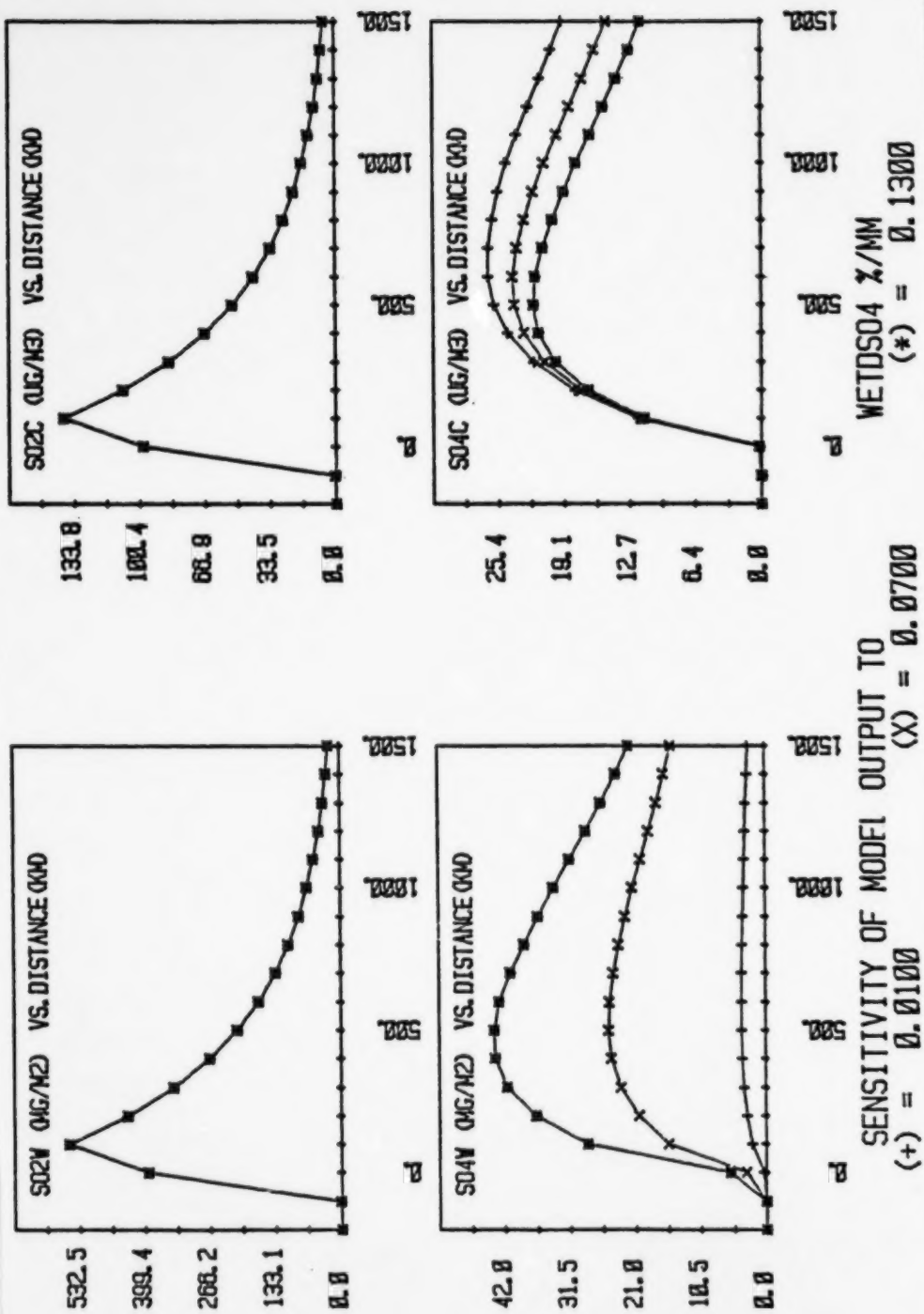


Figure 8h. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_4 wet deposition rate and distance (km) downwind of the source.

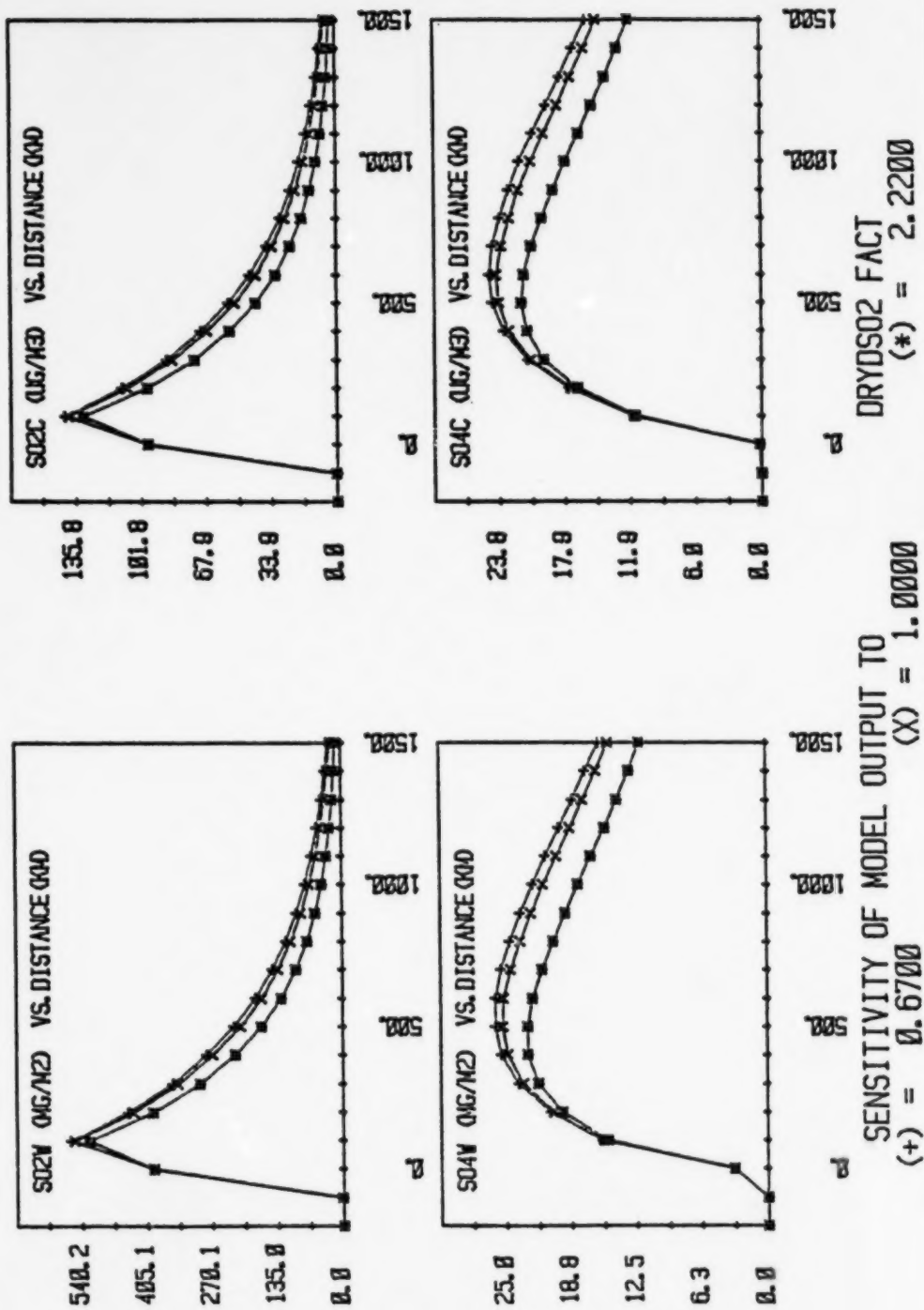
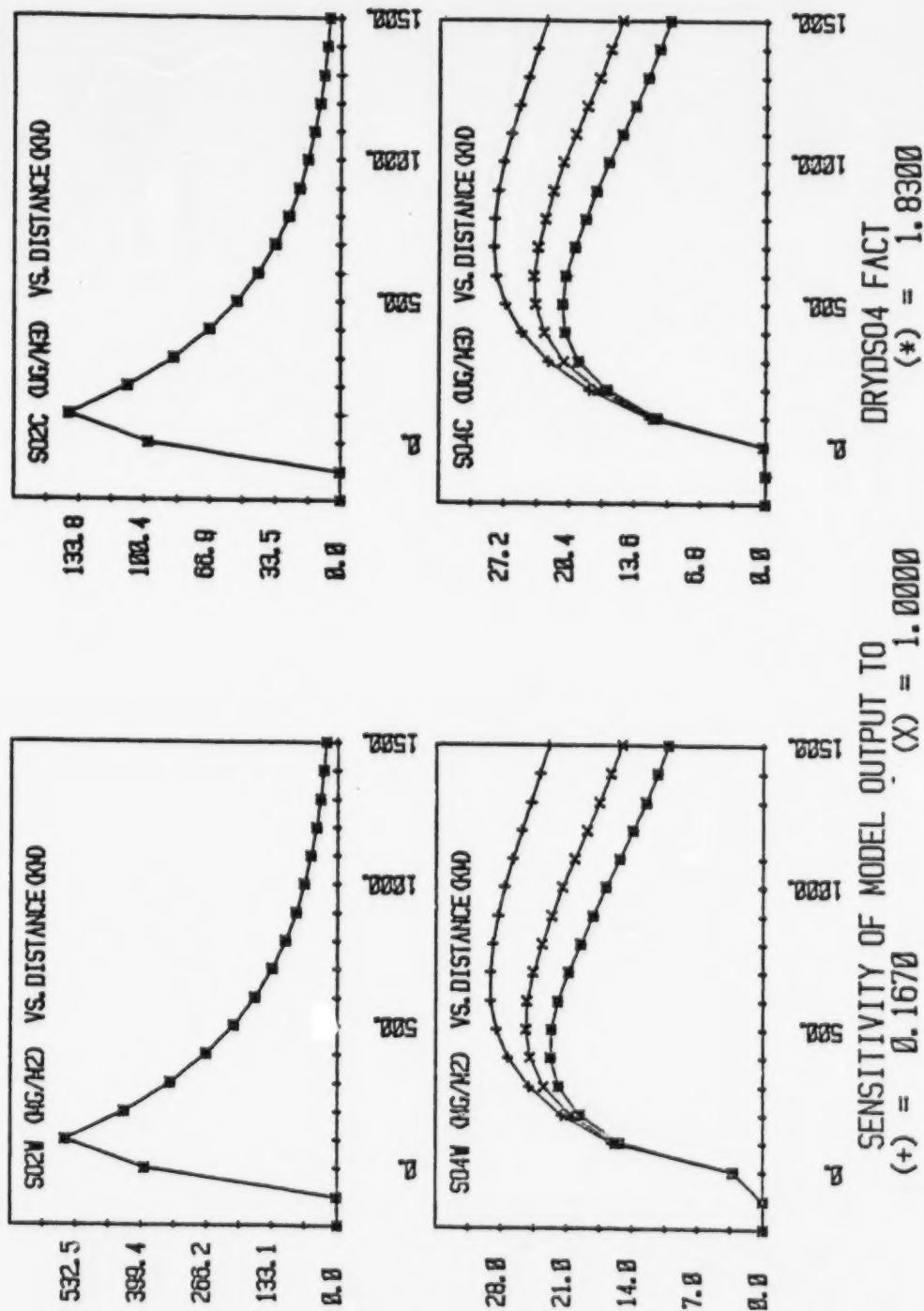


Figure 8i. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_2 dry deposition factor and distance (km) downwind of the source.



tage wise, than those observed after the factor was raised to 2.22. The SO_4^- wet depositions and concentrations 1500 km downwind of the source decreased by about 40% when the factor was increased from 0.167 to 1.83. The effect was less dramatic closer to the source (30% at 500 km), but still substantial.

Figures 8k and 8l illustrate the effects of changing the SO_2 and SO_4^- emission rates. Since ENAMAP-1 assumes only linear chemistry, it was no surprise that the SO_2 and SO_4^- wet depositions and concentrations increased linearly, at respective receptor cells, with increasing SO_2 and SO_4^- emission rates.

The greatest changes occurred in the SO_4^- wet depositions and concentrations near the source when the SO_4^- emission rate was increased. Increasing the emission rate from 0.00 to 0.036 kton h^{-1} increased the SO_4^- concentration across the source cell from nearly 0 to approximately 10 $\mu\text{g m}^{-3}$. Meanwhile, across the adjacent downwind receptor cell, the SO_4^- concentrations increased almost threefold from approximately 11 to approximately 28 $\mu\text{g m}^{-3}$. This illustrates the importance of considering primary emissions of SO_4^- in sulfur pollution modeling.

The last pair of figures in this series, Figures 8m and 8n, illustrate the changes in model output that resulted from changing the rate of SO_2 and SO_4^- mass transfer to the layer above the mixed layer, respectively. Since little is known about the vertical flux of pollutants from the mixed layer, the values of these model input parameters were arbitrarily chosen to be 0.005 and 0.010 kton h^{-1} . Changes in these parameters caused linear changes in the wet depositions and concentrations. At 1500 km from the source, increasing the SO_2 or SO_4^- loss rate from 0.005 to 0.010 kton h^{-1} resulted in a 25% decrease in SO_4^- wet depositions and concentrations. At 500 km, only a 10% difference was observed.

To summarize the preceding discussion, Figure 9 presents plots of the changes in wet sulfur depositions resulting from unit increases in the model

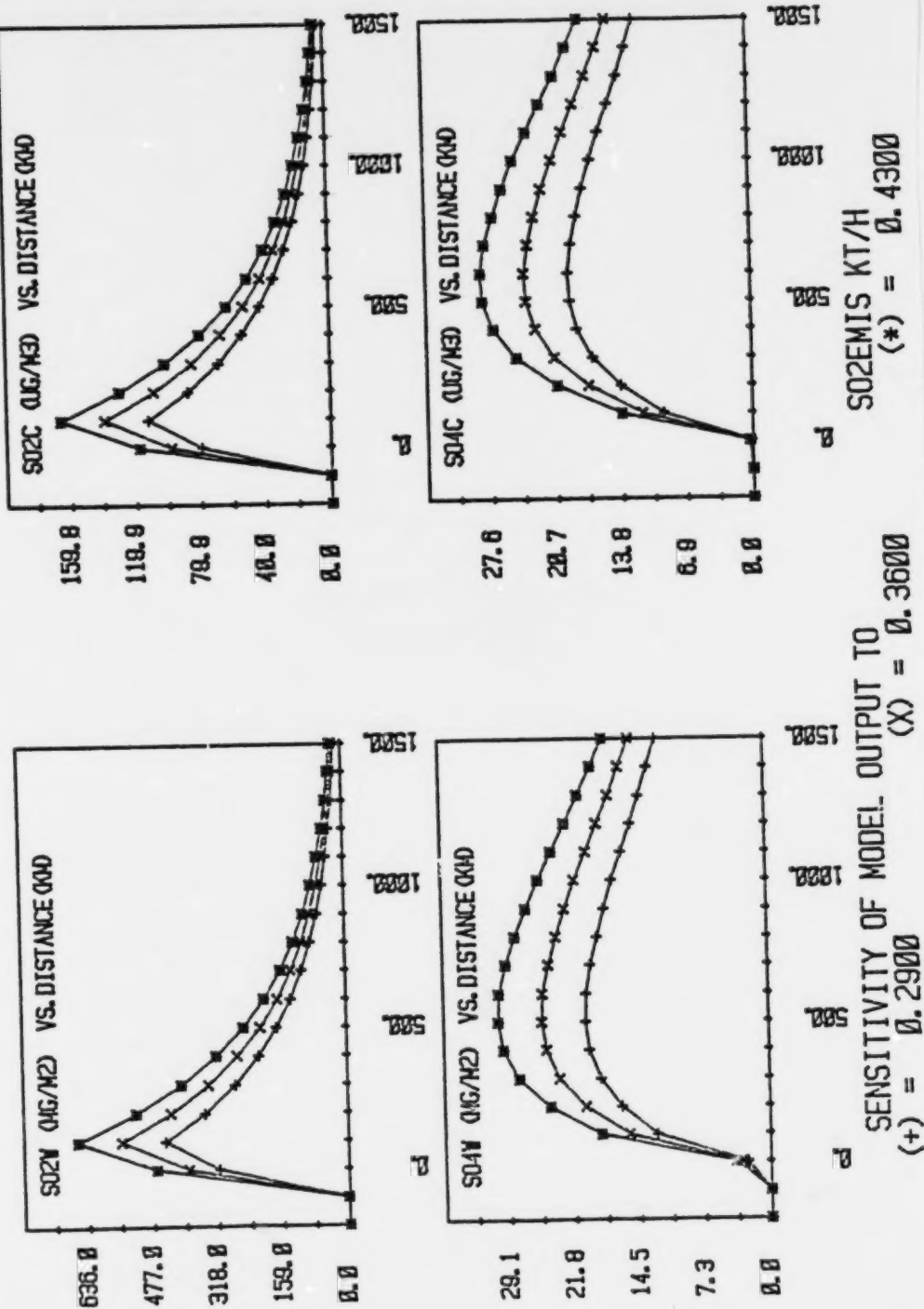


Figure 8k. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_2 emission rate (kton h^{-1}) and distance (km) downwind of the source.

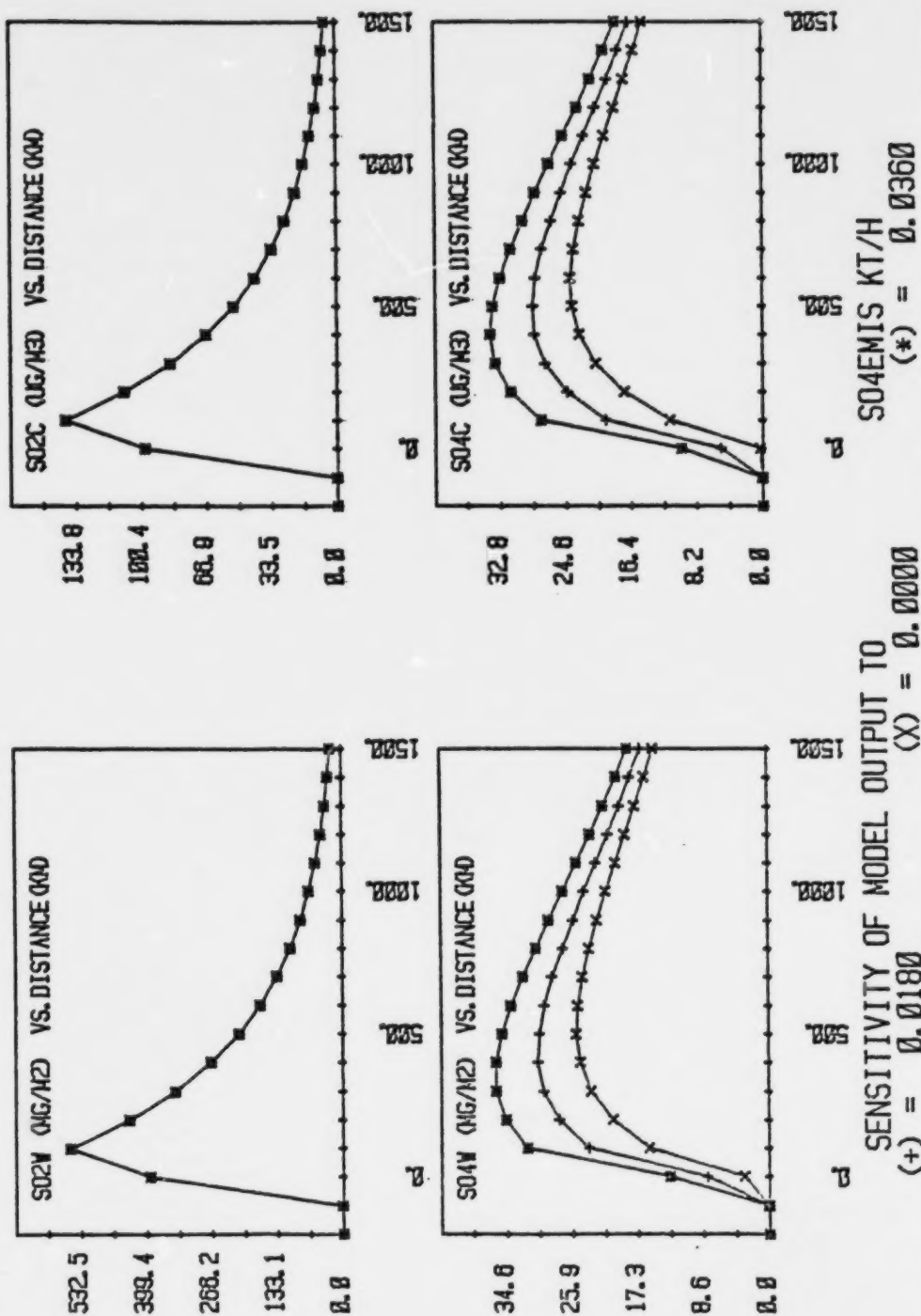


Figure 81. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_4 emission rate (kton h^{-1}) and distance (km) downwind of the source.

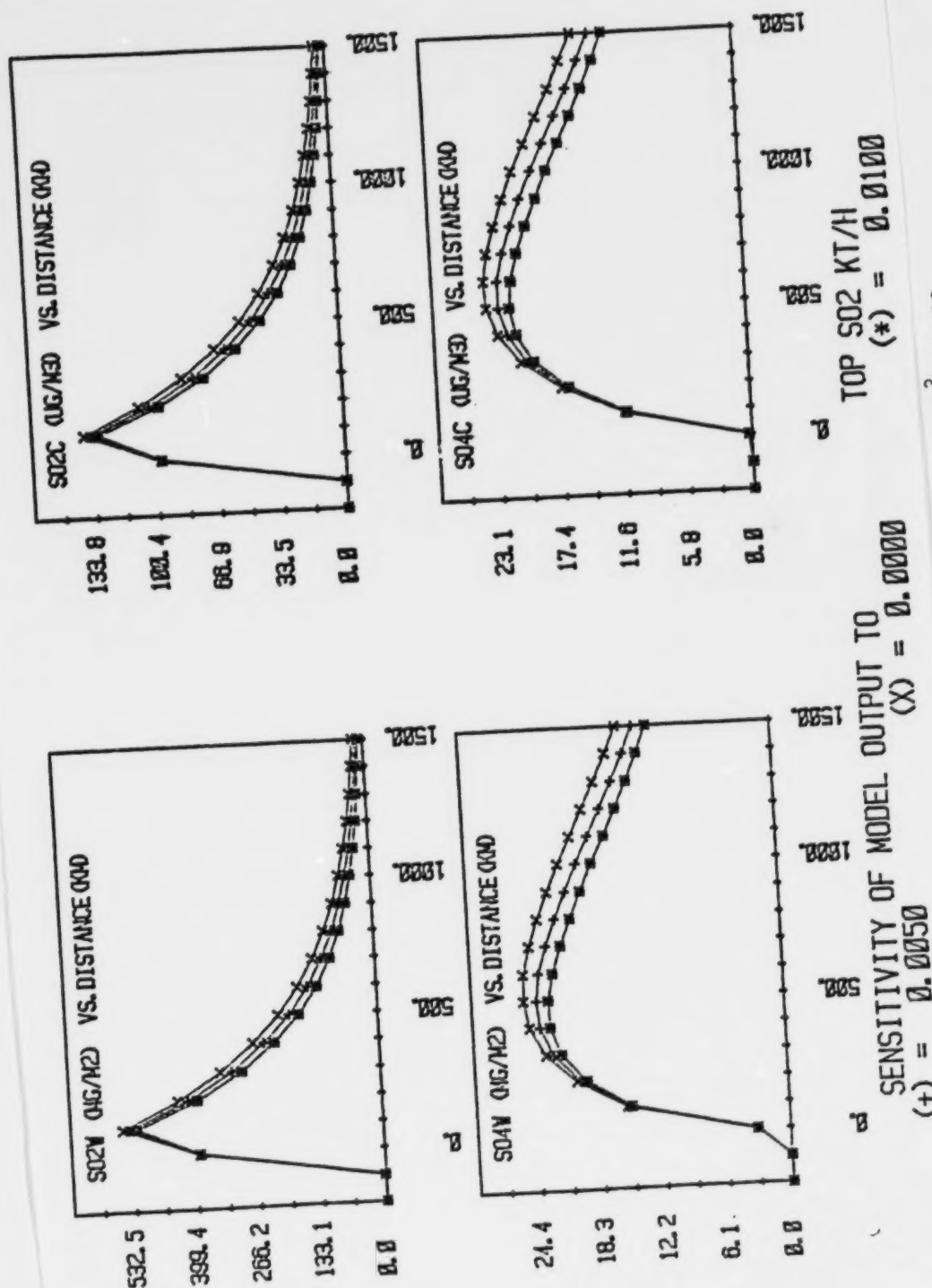


Figure 8m. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4^{2-} as a function of SO_2 loss rate from mixed layer top (kton h^{-1}) and distance (km) downwind of the source.

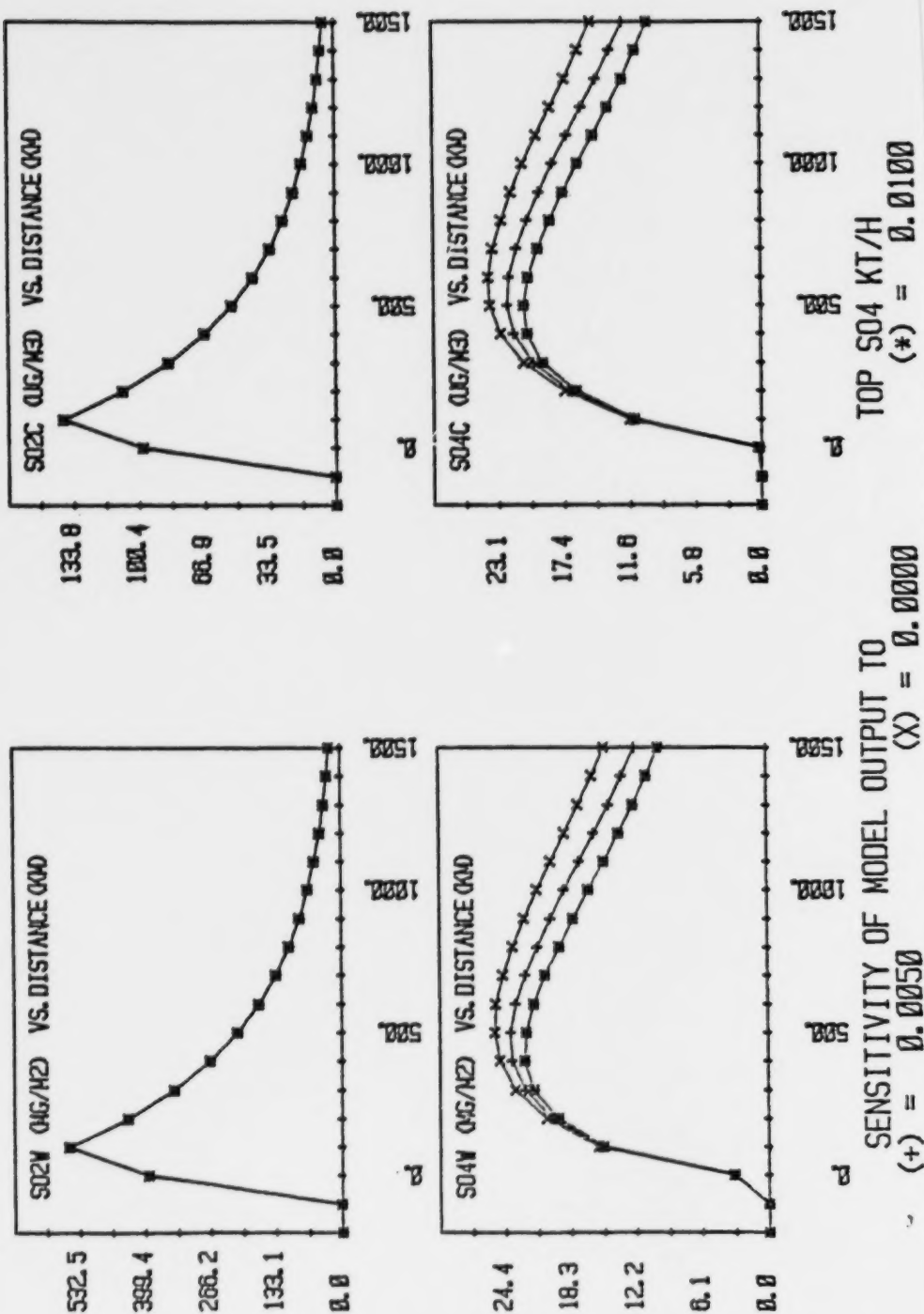


Figure 8n. Wet depositions (mg m^{-2}) and concentrations (mg m^{-3}) of SO_2 and SO_4 as a function of SO_2 loss rate from mixed layer top (kton h^{-1}) and distance (km) downwind of the source.

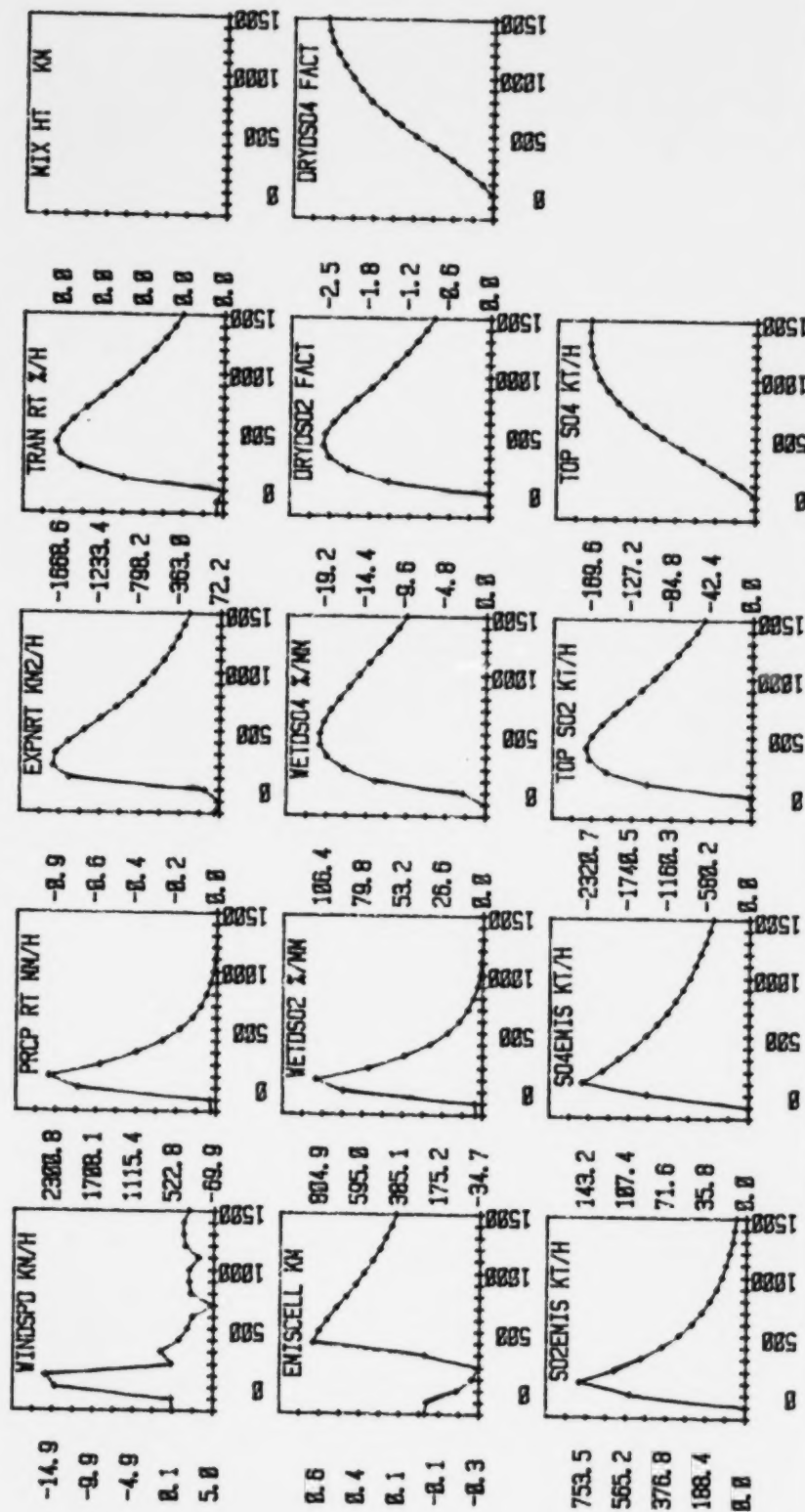


Figure 9. Change in wet deposition of sulfur (mg m^{-2}) per unit change in model input parameters as a function of distance (km) downwind of the single source.

input parameters as a function of distance downwind from the source. When interpreting these plots, one should bear in mind that they were generated assuming

- 1) the ranges of parameter values listed in Table 5, and
- 2) that, at each receptor cell downwind of the source, the wet sulfur depositions changed linearly with changes in the input parameter values.

Table 6 lists the maximum observed changes in wet sulfur depositions for unit increases in 14 of the 15 model input parameters considered in this sensitivity analysis.

TABLE 6. MAXIMUM CHANGES IN WET SULFUR DEPOSITION FOR UNIT INCREASES IN MODEL INPUT PARAMETERS

Model input Parameter*	Parameter Units	Maximum change (mg m ⁻²) per unit increase in the parameter	Distance downwind of source (km)
WINDSPD	km h ⁻¹	-15.7	100
PRCP RT	mm h ⁻¹	2400.0	100
EXPN RT	km ² h ⁻¹	0.9	200
TRAN RT	% h ⁻¹	-17.4	400
MIX HT	km	0.0	-
EMISCELL	km ²	0.6	400
WETDSO2	% mm ⁻¹	8.4	100
WETDSO4	% mm ⁻¹	1.1	400, 500
DRYDSO2	-	-20.0	400
DRYDSO4	-	2.6	1500
SO2EMIS	kton h ⁻¹	785.0	100
SO4EMIS	kton h ⁻¹	149.0	100
TOPSO2	kton h ⁻¹	-2420.0	400
TOPSO4	kton h ⁻¹	-1770.0	1300, 1400

* Parameter codes are defined in Table 5.

Multiple Parameter Variations

This subsection addresses the sensitivity of the model to changes in the values of a set of model input parameters.

The abbreviated version of ENAMAP-1 was applied two more times to compare the calculated wet depositions and concentrations of SO_2 and SO_4 at 100-km increments downwind of the source using the extreme values of many of the input parameters. These values are defined in Table 7. The first application used values that would individually contribute to minimal wet deposition downwind of the source, while the second application used values that would individually contribute to maximum wet deposition. Base case values of the wind speed (24.2 km h^{-1}), precipitation rate (0.1 mm h^{-1}), mixing height (1.45 km), and SO_2 and SO_4 emission rates (0.36 and 0.00 kton h^{-1} , respectively) were used in each of these applications, however.

TABLE 7. EXTREME VALUES USED IN TWO APPLICATIONS TO PRODUCE MINIMUM AND MAXIMUM SULFUR WET DEPOSITION WITHIN 500 KM OF THE SOURCE*

Parameter code#	Value contributing to minimum	Value contributing to maximum
EXPN RT	42.0	29.0
TRAN RT	0.015	0.005
EMISCELL	80.0	60.0
WETDSO2	0.10	0.46
WETDSO4	0.01	0.13
DRYSO2	2.22	0.67
DRTSO4	1.830	0.167
TOPSO2	0.01	0.00
TOPSO4	0.01	0.00

* Base case values were used for emissions and meteorological parameters.

Parameter codes and units are defined in Table 5.

The resulting sets of model output serve as an estimate of the range of the model uncertainty. Figure 10 presents the wet depositions and concentrations of SO_2 and SO_4 as functions of these two sets of model input parameter values and downwind distance from the source. Model results for the entire base case set of values are plotted as a reference. The base case plots represent the values of input parameters used in previous ENAMAP-1 applications.

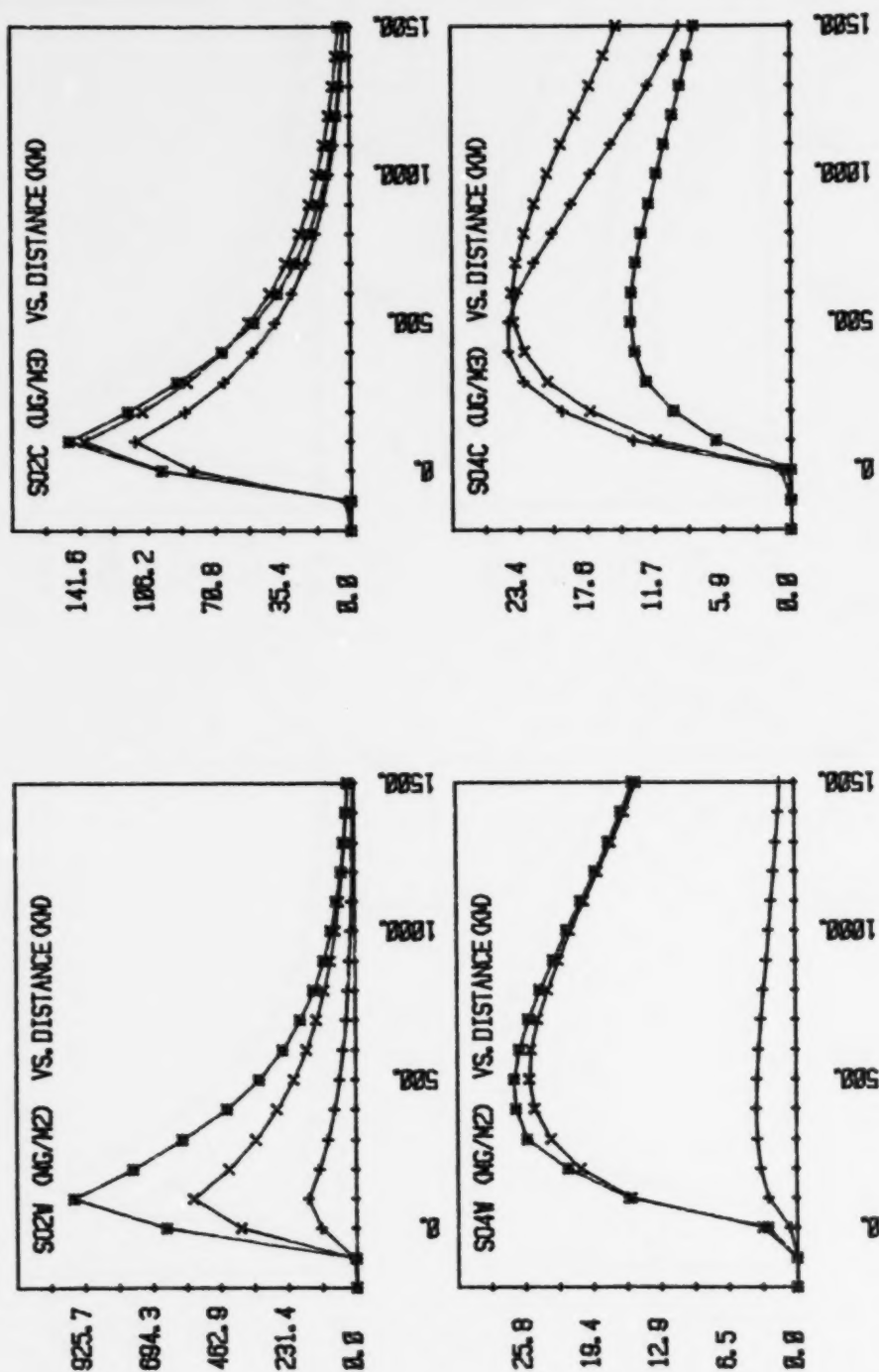


Figure 10. Wet depositions and concentrations of SO_2 and SO_4 downwind of a single source as calculated from high (*), base (x), and low (+) case sets of model input parameter values.

The greatest variation was observed in SO_2 wet deposition 100 km downwind of the source. At this distance, the values ranged from about 150 to about 950 mg m^{-2} , with the base case value exactly in between. As the distance from the source increased, the high case SO_2 wet depositions approached that of the base case, since, for the former, less SO_2 remained suspended in the air further downwind.

There was a significant difference between $\text{SO}_4^{=}$ deposition for the low case and for the high case. The difference peaked at a distance of 400 km from the source, where the low case produced about 4 mg m^{-2} while the high and base cases produced about 25 mg m^{-2} . Even at a distance of 1500 km from the source, where $\text{SO}_4^{=}$ wet deposition was identical in the high and base cases (15 mg m^{-2}), SO_4 wet deposition in the low case was about 2 mg m^{-2} . The higher dry deposition rates, the lower wet deposition rates, and the higher loss rates used in the low case were responsible for these differences. Regarding total sulfur wet deposition, both the magnitude and the variations of SO_2 wet depositions were much more significant.

The variations in SO_2 concentration seemed less significant than those in wet deposition. The greatest variation occurred 100 km downwind of the source, where the concentrations ranged from about 110 to $150 \text{ } \mu\text{g m}^{-3}$. The base case concentration, about $140 \text{ } \mu\text{g m}^{-3}$, was much closer to that of the high case. Beyond 400 km, the base case concentration slightly exceeded those of the other two cases.

The variations in $\text{SO}_4^{=}$ concentration were more significant than those in SO_2 concentration. The variations peaked in magnitude at 400 km from the source. The concentrations at this distance ranged from about 13 to about $24 \text{ } \mu\text{g m}^{-3}$; the maximum was nearly twice the minimum. Beyond 500 km, the base case concentration surpassed those of the other two cases. At 1500 km, the base case concentration was $15 \text{ } \mu\text{g m}^{-3}$; the other two concentrations were about $9 \text{ } \mu\text{g m}^{-3}$.

That the base case $\text{SO}_4^{=}$ concentration exceeded those of the other two cases beyond 500 km was somewhat surprising, since 1) the other two cases employed extreme values of the model input parameters, and 2) the SO_2 and $\text{SO}_4^{=}$ depositions and the SO_2 concentrations for the base case and the high case were very similar beyond 500 km. The differences in $\text{SO}_4^{=}$ concentration resulted directly from the following conditions: 1) the transformation rate for the base case was double that in the high case, 2) the SO_2 wet deposition rate for the base case was lower, enabling more SO_2 to transform to $\text{SO}_4^{=}$. The differences occurred in spite of the facts that 1) the puffs in the base case expanded at a faster rate, and 2) both the SO_2 and $\text{SO}_4^{=}$ wet depositions for the two cases were nearly identical, the $\text{SO}_4^{=}$ wet deposition rate was not a significant factor in the differences in $\text{SO}_4^{=}$ concentration.

This set of model results appeared to reinforce a previously stated conclusion: that ENAMAP-1 appears most sensitive to the SO_2 wet deposition rate. Therefore, further model improvements should focus on the SO_2 wet deposition parameterization.

SECTION 5

SUMMARY AND CONCLUSIONS

In support of Work Group 2 of the U.S./Canadian Memorandum of Intent on Transboundary Air Pollution, ENAMAP-1 was applied 1) to generate January and July 1978 unit transfer matrices for eastern North America, and 2) to evaluate model-calculated sulfur wet depositions and $\text{SO}_4^{=}$ concentrations using measured data for January and July 1978. Furthermore, a shortened version of the model was applied to study the sensitivity of the model output to the values of the model input parameters, as requested by Work Group 2.

The ENAMAP-1 unit transfer matrices defined the source/receptor relationships for 35 source regions, each emitting 1.0 Tg sulfur per year, and 44 receptor regions comprised of the same 35 source regions plus 9 sensitive areas. From these January and July 1978 unit transfer matrices, estimates of the 1978 annual transfer matrices were generated. Unfortunately, the calculated matrix element values could not be evaluated, since the actual contributions of one region to another were unknown.

The unit transfer matrices indicated that the sources within a region contributed significantly to the sulfur depositions and concentrations in that region. Of the total mass of SO_2 wet deposition in any region, 68 and 64% of the SO_2 was emitted from sources within the region itself for January and July 1978, respectively. Since the model results showed that much more SO_2 than $\text{SO}_4^{=}$ was deposited by precipitation, the transfer matrices indicated that local sources impact very significantly on sulfur wet deposition in a given region.

Although the extensive evaluation data set was not available, a model evaluation study was conducted using screened data available for January and July 1978. The screening process left only 5 and 11 sulfur wet deposition measurements for January and July, respectively, and 29 and 47 ambient $\text{SO}_4^{=}$ concentration measurements for January and July, respectively. Many of the sulfur wet deposition measurement sites were located in Canada, while many of the ambient $\text{SO}_4^{=}$ monitoring sites were located in the U.S.

Any conclusions drawn from such a small evaluation data set applicable to only two 1-month periods would not likely apply to much longer periods. However, for this evaluation data set, the model (using the 10^{-4} kton puff truncation value) performed rather well. The ENAMAP-1 January mean sulfur wet deposition was slightly greater than the monthly mean of the measurements at the five sites; the ENAMAP-1 July mean was slightly less than the mean measurement. The mean ambient $\text{SO}_4^{=}$ concentrations calculated by the model (6.3 and 11.8 ug m^{-3} for January and July, respectively) compared very favorably with the mean measurements (6.8 and 11.6 ug m^{-3} for January and July, respectively). The mean residuals for both January and July were less than 1.0 ug m^{-3} . Except for the case of sulfur wet deposition in January, the absolute values of the correlation between the residuals and the model calculations were less than 0.40, indicating that the model performed well for the two 1-month periods.

The model sensitivity study assessed the changes in the model output at 100-km increments downwind of a single source due to changes in the values of one of the model input parameters. Some significant conclusions of this study were:

- 1) The 3-h time step used in previous ENAMAP-1 applications led to a saw-toothed distribution in the model output for moderate and high wind speeds ($>20 \text{ km h}^{-1}$).

- 2) A 2-h time step led to a saw-toothed distribution in the model output for only the high wind speed ($>35 \text{ km h}^{-1}$).
- 3) A 1-h time step did not remove the saw-toothed distribution in the model output for the high wind speed, but it did reduce the amplitude of the fluctuations.
- 4) Within 700 km of the source, SO_2 wet deposition was sensitive to the SO_2 wet deposition rate; at a distance of 100 km from the source, SO_2 wet deposition increased from about 200 to about 800 mg m^{-2} as a result in an increase in the SO_2 wet deposition rate of from 0.10 to $0.46\% \text{ mm}^{-1}$.
- 5) Beyond 200 km of the source, $\text{SO}_4^{=}$ wet deposition was sensitive to the SO_2 wet deposition rate; at a distance of 1500 km from the source, $\text{SO}_4^{=}$ wet deposition decreased from about 25 to about 10 mg m^{-2} for the same increase in the SO_2 wet deposition rate.
- 6) Beyond 100 and 300 km the ambient concentrations of SO_2 and $\text{SO}_4^{=}$, respectively, were sensitive to the SO_2 deposition rate.
- 7) The changes in the SO_2 dry deposition rate (from 67 to 220% of the base case value) did not affect wet deposition and concentrations nearly as much as did the SO_2 and $\text{SO}_4^{=}$ wet deposition rates.
- 8) Changing the $\text{SO}_4^{=}$ dry deposition rate (from 16.7 to 183.0% of the base case value) affected the $\text{SO}_4^{=}$ concentrations and wet depositions much as did changing the SO_2 wet deposition rate.
- 9) The consideration of a small $\text{SO}_4^{=}$ emission rate, 18 t h^{-1} or 5% of the base case SO_2 emission rate, resulted in significant increases in $\text{SO}_4^{=}$ concentrations and wet deposition; at 200 km from the source, deposition and concentration increased 35 and 48%, respectively.

The model sensitivity study also assessed changes in model output at 100-km increments downwind of a single source due to changes in all the model input parameters except those relating to meteorological and emission scenarios. Three cases were considered: a base case consisting of values used in previous ENAMAP-1 applications, a set of values that tended to maximize sulfur wet deposition, and a set that tended to minimize deposition.

This assessment showed that the $\text{SO}_4^{=}$ wet depositions and SO_2 concentrations calculated using the base case values were very similar to those calculated using the high case values. Furthermore, the $\text{SO}_4^{=}$ concentrations beyond 500 km of the source calculated for the base case were greater than those calculated for the other two cases.

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APPENDIX A

44 BY 44 UNIT TRANSFER MATRICES FOR JANUARY AND JULY 1978

The following transfer matrices show the effects of 1.0 Tg yr⁻¹ sulfur emissions from 44 emission regions (35 of the 40 Work Group 2 regions plus the 9 Work Group 2 sensitive receptors) on the monthly wet and dry depositions and ambient concentrations of SO₂ and SO₄²⁻ across the same regions (see Figure 4). The units of the deposition matrix elements are mg m⁻²(Tg S yr⁻¹)⁻¹; those of the concentration matrix elements are mg m⁻³(Tg S yr⁻¹)⁻¹. To convert the deposition units to kg ha⁻¹(Tg S yr⁻¹)⁻¹, the values must be divided by 100.

The 44 source/receptor regions in these matrices are defined as follows:

<u>Number</u>	<u>State/Province</u>	<u>Number</u>	<u>State/Province</u>
1	Ohio	23	Texas, Oklahoma
2	Illinois		Kansas, Eastern Colorado
3	Pennsylvania	24	Southern Manitoba,
4	Indiana		Southern Saskatchewan
5	Kentucky	25	Western Ontario
6	Michigan	26	Central Ontario
7	Tennessee	27	Sudbury, Ontario
8	Missouri	28	Southern Quebec
9	West Virginia	29	Eastern Ontario
10	New York	30	Southern Quebec
11	Alabama	31	Central Quebec
12	Wisconsin, Iowa	32	Eastern Quebec
13	Minnesota	33	New Brunswick
14	Virginia, North Carolina	34	Southern Nova Scotia,
15	Northern Florida		Prince Edward Island
16	Georgia, South Carolina	35	Labrador
17	Maryland, D.C.	36	Boundary Water, Ontario*
	Delaware, New Jersey	37	Algoma, Ontario*
18	Louisiana, Arkansas	38	Muskoka, Ontario*
	Mississippi	39	Laurentian Mountains,
19	Connecticut, Rhode Island		Quebec*
	Massachusetts	40	Southern Nova Scotia*
20	Maine	41	Northern New Hampshire*
21	New Hampshire, Vermont	42	Adirondack Mountains*
22	Nebraska, South Dakota,	43	Central Pennsylvania*
	North Dakota	44	Great Smoky Mountains*

* The 9 sensitive receptors were also considered as sources.

SO₂ Wet Deposition Unit Transfer Matrix

January 1978

JANUARY 1978

TOTAL CONTRIBUTIONS TO SO2 NET DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	214.56	1.03	24.70	10.53	21.19	.31	1.85	.04	31.55	3.82	.18	.00
2	2.01	76.99	.04	19.95	8.64	.89	6.13	11.43	.38	.04	.66	.21
3	32.72	.02	231.24	2.25	8.96	.00	.68	.02	28.67	13.08	.00	.00
4	20.64	11.77	.68	236.20	32.23	1.06	5.75	1.36	3.11	.23	.88	.00
5	3.94	6.98	.97	16.09	223.75	.08	41.47	4.43	1.29	.19	8.44	.00
6	36.70	3.56	11.76	20.78	1.26	37.99	.46	.26	.59	9.36	.16	.50
7	.70	4.08	1.13	2.95	19.56	.00	247.50	.10	2.87	.34	18.12	.00
8	.88	11.68	.04	4.11	5.23	.05	8.63	62.56	.13	.03	.82	.07
9	41.72	.00	29.99	.21	25.19	.00	2.30	.00	444.86	6.55	.00	.00
10	2.73	.01	29.34	.57	.29	.01	.03	.00	2.18	175.82	.00	.00
11	.00	.05	.21	.01	.32	.00	11.49	.00	.06	.12	166.52	.00
12	1.33	15.85	.16	13.59	1.34	6.85	.17	1.52	.08	.03	.03	25.01
13	.34	5.33	.01	2.79	1.16	1.29	.33	1.36	.00	.01	.01	12.74
14	.00	.00	3.14	.00	.98	.00	2.23	.00	1.15	1.49	.01	.00
15	.00	.00	.00	.00	.00	.00	.15	.00	.00	.00	17.27	.00
16	.00	.00	.52	.00	.16	.00	6.25	.00	.01	.12	10.05	.00
17	.00	.00	37.62	.00	.07	.00	.02	.00	10.23	19.62	.00	.00
18	.00	.00	.04	.00	.06	.00	.54	.04	.07	.03	9.15	.00
19	.02	.00	30.19	.00	.20	.00	.06	.00	5.70	34.67	.00	.00
20	.27	.00	15.39	.00	.30	.00	.08	.00	2.74	12.98	.00	.00
21	.15	.00	19.85	.00	.66	.00	.14	.00	4.83	26.91	.00	.00
22	.00	.02	.00	.00	.01	.03	.00	.04	.00	.00	.02	.14
23	.02	.01	.00	.07	.09	.00	.10	.17	.00	.00	.06	.00
24	.01	.29	.00	.19	.01	.09	.01	.16	.00	.00	.00	.54
25	.54	.65	.44	.05	.06	20.24	.07	.18	.05	1.59	.02	2.41
26	1.45	1.42	.42	.67	.08	1.29	.01	.01	.06	5.02	.01	.45
27	4.24	1.72	1.01	1.27	.55	.69	.01	.01	.08	12.33	.00	.17
28	15.55	1.22	16.44	6.12	1.12	2.48	.50	.02	.97	40.19	.04	.00
29	3.80	.32	7.33	1.06	.96	.14	.18	.01	.80	52.34	.03	.00
30	1.04	.00	1.43	.11	.01	.16	.00	.00	.12	8.57	.00	.00
31	.16	.15	.38	.43	.01	.32	.01	.00	.01	6.04	.00	.06
32	.00	.00	.32	.00	.00	.00	.00	.00	.01	.00	.00	.00
33	.00	.00	4.22	.00	.00	.00	.00	.00	.01	1.89	.00	.00
34	.00	.00	.43	.00	.00	.00	.00	.00	.00	.91	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.02	.00	.52	.00	.00	.00	.00	.00	.55
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.22	.00	.00	.00	.00	.00	.00	.68	.00	.00
41	.29	.00	2.62	.00	.05	.00	.00	.00	1.12	3.24	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00
43	.00	.00	.90	.00	.00	.00	.00	.00	.14	.09	.00	.00
44	.00	.00	.02	.00	.00	.00	.21	.03	.00	.00	.00	.00
TOTAL	386.27	143.19	473.40	342.04	354.56	74.48	357.36	83.72	543.86	438.48	232.48	42.84

TOTAL CONTRIBUTIONS TO S02 WET DEPOSITION MGRRS/M2 WITHIN RECEPTION REGIONS												
JANUARY 1978												
EMITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24
1	.00	1.71	.08	.68	1.53	.01	.21	.02	.08	.00	.00	.00
2	.00	.06	.16	.22	.02	1.65	.00	.01	.00	.00	.00	.00
3	.00	3.79	.00	.18	18.73	.00	.52	.20	.67	.00	.00	.00
4	.00	.65	.34	.00	.17	.50	.00	.00	.00	.00	.00	.00
5	.00	.42	.38	.278	.00	1.88	.00	.00	.00	.00	.00	.00
6	.00	.15	.07	.07	1.12	.12	1.56	.71	2.44	.00	.01	.00
7	.00	2.16	2.87	9.63	.16	2.24	.00	.02	.05	.00	.00	.00
8	.00	.07	.35	.50	.03	8.06	.00	.00	.00	.01	.62	.00
9	.00	9.22	.02	2.22	2.35	.00	.00	.09	.39	.00	.00	.00
10	.00	5.26	.01	.00	40.33	.00	42.20	3.38	56.56	.00	.00	.00
11	.00	1.33	19.12	14.61	.54	3.72	.16	.08	.19	.00	.00	.00
12	1.75	.01	.02	.04	.03	.08	.00	.00	.00	.04	.05	.00
13	26.63	.01	.00	.02	.00	.18	.00	.00	.00	.20	.01	.00
14	.00	98.21	.08	8.16	11.04	.00	.30	.11	.17	.30	.11	.00
15	.00	.59	164.71	2.89	.01	.41	.00	.00	.00	.00	.00	.00
16	.00	2.21	6.95	100.73	1.22	.00	.15	.13	.17	.00	.00	.00
17	.00	20.02	.00	.05	300.62	.00	3.69	1.33	7.01	.00	.00	.00
18	.00	.23	4.17	.78	.06	52.05	.01	.00	.00	.00	.20	.00
19	.00	3.36	.00	.00	27.93	.00	358.03	14.18	29.43	.00	.00	.00
20	.00	.18	.00	.00	2.00	.00	34.79	245.55	61.64	.00	.00	.00
21	.00	.53	.01	.00	4.98	.00	59.24	21.81	522.50	.00	.00	.00
22	.74	.00	.00	.00	.00	.05	.00	.00	.00	9.53	.15	.49
23	.00	.02	.02	.03	.00	.00	.00	.00	.00	.00	11.65	.00
24	2.78	.00	.00	.00	.00	.01	.00	.00	.00	2.08	.03	5.26
25	1.16	.01	.04	.01	.09	.07	.11	.03	.47	.01	.00	.01
26	.00	.01	.00	.00	.59	.00	1.67	3.24	6.69	.00	.00	.00
27	.00	.02	.00	.00	.83	.00	3.41	2.83	14.30	.00	.00	.00
28	.00	.17	.10	.01	2.99	.05	6.90	1.11	6.40	.00	.00	.00
29	.00	.06	.18	.02	2.69	.00	10.96	2.80	13.72	.00	.00	.00
30	.00	.01	.00	.00	.83	.00	5.86	38.46	54.95	.00	.00	.00
31	.00	.00	.00	.00	.19	.00	.77	2.84	6.84	.00	.00	.00
32	.00	.00	.00	.00	.01	.00	.01	3.63	.04	.00	.00	.00
33	.00	.01	.00	.00	.80	.00	2.94	17.88	5.28	.00	.00	.00
34	.00	.00	.00	.00	.42	.00	4.19	1.90	4.84	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.57	.00	4.12	.13	1.76	.00	.00	.00
41	.00	.03	.00	.00	.27	.00	3.20	13.74	39.03	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00
43	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
44	.00	.35	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	33.26	151.41	201.68	145.31	423.23	73.92	545.01	376.23	835.68	11.87	12.76	5.77

EMITTER REGION	JANUARY 1978											
	TOTAL CONTRIBUTIONS TO SO2 NET DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS											
	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.10	.24	8.68	4.99	.15	.16	.45	.04	.01	.01	.00
2	.00	.21	.00	.10	.27	.04	.05	.07	.04	.00	.00	.00
3	.00	.02	.00	.75	9.76	1.09	.33	.65	.15	.03	.01	.00
4	.00	.09	.23	1.55	.59	.12	.05	.19	.04	.00	.01	.00
5	.00	.00	.00	.04	.16	.07	.00	.13	.03	.00	.00	.00
6	.05	1.31	1.23	44.63	7.22	1.03	.36	.49	.27	.00	.01	.00
7	.00	.00	.00	.00	.08	.02	.00	.15	.06	.23	.01	.00
8	.00	.06	.22	.06	.05	.03	.03	.08	.02	.00	.00	.00
9	.00	.00	.00	.13	6.72	.34	.06	.90	.16	.04	.04	.00
10	.00	.00	.00	1.15	4.39	12.94	.60	1.73	2.02	1.31	.02	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.13	.18	.00	.00
12	.06	.63	.20	.36	.01	.01	.03	.02	.00	.00	.00	.13
13	.88	.30	.05	.04	.05	.00	.04	.00	.00	.00	.00	10.18
14	.00	.00	.00	.00	.16	.00	.00	.00	.15	.28	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.11	.16	.00	.00
17	.00	.00	.00	.00	6.70	4.60	.34	.73	2.19	.96	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.01	.01	.01	.00	.00
19	.00	.00	.00	.00	.37	4.38	.39	.79	4.06	5.87	.01	.00
20	.00	.00	.00	.00	.32	1.48	.43	5.84	18.57	9.60	.06	.00
21	.00	.00	.00	.00	.23	2.72	.59	3.26	4.20	1.18	.06	.00
22	.00	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.13
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.40	.04	.11	.00	.02	.00	.01	.00	.00	.00	.00	.46
25	24.54	6.70	.00	1.62	1.16	.03	1.04	.02	.00	.00	.00	36.19
26	.00	38.79	130.64	9.56	39.61	3.50	6.16	3.02	.06	.00	.04	.00
27	.00	4.55	946.68	11.21	58.16	3.21	5.16	4.86	.17	.00	.03	.00
28	.00	.64	4.35	149.75	52.85	3.01	1.62	2.49	1.03	.01	.02	.00
29	.00	.08	.10	28.15	167.55	6.56	2.27	3.52	.58	.01	.01	.00
30	.00	.00	.00	1.31	.62	121.97	.89	11.55	5.36	.36	.02	.00
31	.00	.92	.42	.45	12.46	14.71	19.85	7.12	2.17	.28	.16	.00
32	.00	.00	.00	.00	.00	3.41	.06	152.39	30.78	24.96	.07	.00
33	.00	.00	.00	.00	.00	.22	.06	5.75	127.42	63.87	.03	.00
34	.00	.00	.00	.00	.00	.08	.01	1.60	14.27	110.46	.09	.00
35	.00	.00	.00	.00	.00	.00	.82	17.63	.01	.17	5.89	.00
36	.13	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	15.29
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.25	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.06	.01	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.03	.03	.45	.05	17.76	.00	.00
41	.00	.00	.00	.00	.11	2.86	.10	.74	1.48	.48	.01	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	26.15	54.50	1084.82	259.65	374.94	188.65	41.56	226.64	215.62	238.22	6.62	62.38

TOTAL CONTRIBUTIONS TO S02 NET DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS											
JANUARY 1978											
EMITTER	37	38	39	40	41	42	43	44	45	46	47
1	.04	9.22	.18	.00	.13	2.27	8.33	1.92			
2	.19	.08	.03	.00	.01	.00	.02	.38			
3	.00	8.40	.19	.00	.59	10.17	82.86	1.81			
4	.07	.23	.11	.00	.00	.04	.31	1.13			
5	.00	.16	.05	.00	.01	.06	.00	2.58			
6	1.92	11.95	2.64	.00	.51	2.17	2.00	.03			
7	.00	.00	.01	.00	.20	.60	.64	28.72			
8	.26	.05	.03	.00	.00	.00	.01	.11			
9	.00	9.55	.11	.00	.46	5.13	18.03	5.39			
10	.00	.47	7.00	.24	40.68	46.43	25.99	.03			
11	.00	.00	.00	.04	.14	.05	.05	9.80			
12	.65	.00	.01	.00	.00	.00	.03	.01			
13	.01	.07	.00	.00	.01	.00	.00	.00			
14	.00	.00	.00	.15	.09	1.67	5.65	35.87			
15	.00	.00	.00	.00	.00	.00	.00	.18			
16	.00	.00	.00	.03	.07	.02	.11	14.42			
17	.00	1.07	.70	.03	6.98	26.63	17.63	2.41			
18	.00	.00	.00	.00	.00	.00	.00	.45			
19	.00	.00	14.81	6.44	24.80	3.50	8.75	.01			
20	.00	.00	.75	15.73	18.03	11.01	28.62	.00			
21	.00	.00	4.00	2.36	47.08	6.78	45.43	.00			
22	.01	.00	.00	.00	.01	.00	.01	.00			
23	.00	.00	.00	.00	.00	.00	.01	.00			
24	.01	.01	.00	.00	.01	.00	.00	.00			
25	5.98	.17	.00	.00	.07	.32	.21	.00			
26	4.56	48.10	1.13	.00	8.45	15.53	.44	.01			
27	.00	104.55	1.14	.00	12.66	21.03	.22	.01			
28	.00	15.21	4.41	.00	1.51	2.78	3.46	.02			
29	.00	40.02	7.95	.00	11.84	38.77	1.21	.01			
30	.00	.00	15.32	.00	144.54	12.74	.43	.00			
31	.00	5.30	1.70	.00	5.45	13.50	.06	.00			
32	.00	.00	.00	.450	.06	.03	.39	.00			
33	.00	.00	.00	40.28	.73	.20	3.10	.00			
34	.00	.00	.31	57.96	.55	.00	.00	.00			
35	.00	.00	.00	.22	.00	.00	.00	.00			
36	.00	.00	.00	.00	.00	.00	.00	.00			
37	.00	.00	.00	.00	.00	.00	.00	.00			
38	.00	.00	.00	.00	.00	.00	.00	.00			
39	.00	6.75	.00	.00	.00	.00	.00	.00			
40	.00	.00	2.41	.00	.00	.00	.00	.00			
41	.00	.00	.00	208.84	.00	.00	.00	.00			
42	.00	.00	.00	.51	265.75	4.03	3.60	.00			
43	.00	.00	.00	.00	.00	3.43	.00	.00			
44	.00	.00	.00	.00	.00	.00	50.71	.00			
45	.00	.00	.00	.00	.00	.00	.01	58.05			
TOTAL	13.75	263.40	64.99	337.40	591.63	228.91	308.45	162.96			

SO₂ Dry Deposition Unit Transfer Matrix

January 1978

JANUARY 1978
TOTAL CONTRIBUTIONS TO S02 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTION REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	303.53	2.36	113.86	14.80	38.25	3.56	6.30	1.28	117.09	22.57		
2	19.55	336.04	2.94	91.75	40.99	11.55	31.76	55.13	5.73	1.59	.70	.00
3	41.13	.14	370.07	1.34	8.33	.00	2.70	.15	37.21	35.74	11.47	7.13
4	100.70	37.59	14.02	405.89	103.52	16.79	26.31	9.88	36.81	5.40	.57	.00
5	11.09	21.84	4.22	31.92	389.36	.25	146.54	6.66	19.17	2.30	4.74	.32
6	69.32	21.22	36.35	46.43	4.90	175.04	2.74	6.66	8.11	32.04	32.32	.03
7	2.32	12.42	2.50	1.72	54.70	.01	414.36	.85	9.00	1.12	65.68	3.07
8	9.85	69.69	2.23	26.04	31.05	1.01	53.07	269.19	2.87	1.29	13.59	.00
9	33.04	.01	92.12	.07	20.97	.00	6.35	.03	610.34	11.79	1.56	1.66
10	3.74	.12	36.95	.78	1.09	.13	.59	.05	1.30	249.67	.26	.00
11	.00	.21	.07	.01	.84	.00	19.18	.02	.06	.10	289.96	.00
12	9.49	75.04	1.53	30.79	4.51	30.42	1.93	16.50	2.89	.32	.48	.00
13	2.24	24.84	.66	7.15	3.76	4.34	3.40	9.82	.56	.14	1.68	141.39
14	.01	.00	3.22	.00	.33	.00	1.95	.00	2.07	1.16		72.49
15	.00	.00	.00	.00	.00	.00	.44	.00	.00	.00	.30	.00
16	.00	.00	.23	.02	.55	.00	6.54	.00	.00	.00	41.54	.00
17	.00	.00	43.97	.00	.41	.00	.55	.00	.02	.06	21.55	.00
18	.00	.00	.09	.00	.46	.00	3.09	.04	.30	36.11	.38	.00
19	.01	.00	19.90	.00	.85	.00	.58	.00	2.68	42.91	38.77	.00
20	.11	.00	8.98	.00	.36	.00	.06	.00	.86	18.23	.39	.00
21	.41	.00	17.05	.00	1.49	.00	.69	.00	2.56	43.57	.01	.00
22	.04	.47	.01	.11	.15	.00	.46	.00	.01	.00	.41	.00
23	.20	.43	.03	.46	.08	.02	.07	3.11	.02	.03	.24	2.85
24	1.2	1.51	.02	.57	.42	.20	.45	3.85	.01	.02	1.17	.02
25	1.86	4.15	1.65	1.36	.15	78.11	.20	3.05	.08	.02	.18	4.08
26	3.10	6.03	3.60	2.44	1.10	15.09	.23	1.99	.24	3.22	.07	24.08
27	5.23	6.80	5.42	3.89	1.41	12.32	.39	2.36	.56	34.96	.02	1.24
28	35.76	7.21	46.37	2.45	5.18	17.06	3.05	2.63	2.46	129.70	.58	.00
29	13.54	3.06	14.94	10.45	3.77	4.55	1.96	1.22	1.52	131.13	.49	.00
30	.67	.03	2.62	1.01	.26	.56	.00	.00	.15	18.81	.00	.00
31	.61	1.81	1.70	.80	.22	3.62	.05	.34	.14	10.77	.00	.00
32	.00	.00	.08	.00	.00	.00	.00	.00	.00	.15	.00	.45
33	.00	.00	.92	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.06	.00	.00	.00	.00	.00	.00	1.11	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.22	.00	.00
36	.00	.03	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.77	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.61
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.18	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	2.54	.00	.11	.00	.01	.00	.00	7.51	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	3.46	.00	.00	.00	.00	.00	.00	.02	.00	.00
45	.00	.00	.05	.00	.00	.00	.00	.00	.08	.16	.00	.00
TOTAL	607.96	635.04	834.64	704.26	719.58	375.58	736.23	396.70	871.69	865.26	528.94	262.65

JANUARY 1976
TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTION REGIONS

EMITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24
1	.00	22.33	.30	3.49	37.36	1.46	8.74	1.18	5.07	.00	.00	.00
2	.00	3.08	1.42	3.78	1.25	9.08	.56	.14	.55	.00	.33	.00
3	.00	14.75	.09	.12	120.78	.58	22.01	1.59	8.76	.00	.00	.00
4	.00	15.44	2.63	8.91	6.29	5.66	2.07	.37	1.55	.00	.00	.00
5	.00	13.53	6.65	20.05	3.66	11.07	.35	.21	.67	.00	.00	.00
6	.03	3.25	.16	.71	8.49	1.73	8.09	1.43	4.02	.00	.01	.00
7	.00	18.83	8.32	47.38	2.76	13.55	.28	.24	.51	.00	.00	.00
8	.00	1.40	2.15	7.19	.94	33.85	.35	.12	.45	.15	3.80	.00
9	.00	66.25	.15	5.68	85.65	.92	6.06	1.28	3.75	.00	.00	.00
10	.00	1.97	.05	.03	69.23	.07	90.62	16.23	86.37	.00	.00	.00
11	.00	4.64	59.36	87.06	1.58	12.20	.38	.22	.15	.00	.00	.00
12	10.55	.91	.22	.68	.67	.61	.10	.04	.06	.44	.33	.00
13	228.30	.34	.44	.67	.36	1.80	.08	.02	.07	4.29	.57	.01
14	.00	168.41	.15	19.36	25.50	.01	.76	.19	.22	.00	.00	.00
15	.00	.35	466.87	19.37	.00	2.54	.00	.00	.00	.00	.00	.00
16	.00	12.50	19.18	212.02	1.65	1.87	.30	.19	.05	.00	.00	.00
17	.00	18.98	.02	.07	482.34	.06	27.26	4.74	10.01	.00	.00	.00
18	.00	.52	19.11	9.06	.10	101.37	.02	.01	.02	.00	.73	.00
19	.00	1.88	.10	.01	37.71	.01	657.04	20.56	39.02	.00	.00	.00
20	.00	.53	.01	.02	9.52	.00	46.99	350.64	103.17	.00	.00	.00
21	.00	.72	.13	.02	11.32	.01	200.66	36.47	611.11	.00	.00	.00
22	10.93	.03	.03	.06	.01	1.01	.00	.00	.00	155.09	5.71	9.73
23	.00	.02	1.83	.31	.00	15.39	.00	.00	.01	.03	53.64	.00
24	22.86	.04	.03	.05	.04	.66	.01	.00	.01	51.75	1.00	131.32
25	13.77	.13	.03	.02	.72	.15	1.06	.15	.57	.68	.06	.96
26	.00	.22	.00	.04	1.26	.08	14.25	4.85	22.81	.00	.00	.00
27	.00	.31	.01	.02	2.04	.12	20.32	4.11	26.27	.00	.00	.00
28	.00	1.36	.27	.14	13.27	1.24	25.86	4.49	14.01	.00	.00	.00
29	.00	.51	.20	.05	7.57	.41	35.91	9.21	44.27	.00	.00	.00
30	.00	.25	.00	.00	2.45	.00	17.48	100.86	114.13	.00	.00	.00
31	.00	.12	.00	.00	.86	.00	11.57	22.72	26.88	.00	.00	.00
32	.00	.00	.00	.00	.00	.00	.45	11.92	.25	.00	.00	.00
33	.00	.00	.00	.00	1.21	.00	5.79	69.15	5.31	.00	.00	.00
34	.00	.00	.00	.00	.06	.00	2.16	5.89	2.28	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.06	.25	.00	.00	.00	.00
36	3.52	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.05	.00	1.72	2.71	.40	.00	.00	.00
42	.00	.00	.00	.00	.85	.00	6.83	46.59	45.97	.00	.00	.00
43	.00	.00	.00	.00	.33	.00	.00	.00	.01	.00	.00	.00
44	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.00
TOTAL	289.95	376.46	569.91	451.05	937.96	217.33	1216.17	758.77	1180.78	212.42	66.19	142.02

JANUARY 1978

TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MG/KMS/H2 WITHIN RECEPTION REGIONS

EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.25	2.75	31.52	8.16	1.77	.37	.54	.30	.43	.52	.00
2	.00	.60	1.90	5.97	2.34	1.90	.25	.05	.06	.05	.10	.00
3	.00	.01	.04	3.84	8.53	2.79	.20	.88	.74	1.15	.56	.00
4	.00	.42	4.20	11.45	6.80	1.06	.46	.19	.15	.17	.35	.00
5	.00	.00	.00	.19	.79	.70	.10	.16	.12	.12	.26	.00
6	.27	4.92	35.60	151.95	30.81	3.15	1.71	.23	.38	.27	.33	.01
7	.00	.00	.00	.01	.17	.39	.02	.17	.21	.22	.07	.00
8	.00	.16	1.80	4.00	1.37	.25	.19	.08	.08	.06	.12	.00
9	.00	.00	.00	2.12	5.44	1.81	.03	1.14	.73	.58	.24	.00
10	.00	.01	.00	4.59	13.33	20.11	.97	1.34	4.83	3.53	1.01	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.13	.04	.00	.00
12	.61	2.00	2.96	2.35	.45	.08	.20	.01	.01	.01	.01	.00
13	9.24	1.06	.32	.46	.20	.04	.09	.00	.00	.00	.01	3.60
14	.00	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00	50.30
15	.00	.00	.00	.00	.00	.00	.00	.00	.14	.16	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.09	.03	.00	.00
18	.00	.00	.00	.00	4.96	1.90	.06	.59	3.03	2.83	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00
20	.00	.00	.00	.00	1.99	4.92	.13	.80	9.40	9.35	.00	.00
21	.00	.00	.00	.00	1.66	8.45	.78	5.41	56.37	42.96	.30	.00
22	1.22	.11	.03	.05	3.38	6.17	.60	2.39	7.28	8.29	.16	.00
23	.00	.00	.05	.06	.03	.00	.01	.00	.00	.00	.00	.53
24	4.92	.08	.07	.06	.03	.01	.00	.00	.00	.00	.00	.00
25	108.74	13.35	2.67	9.49	3.46	.14	.56	.03	.04	.03	.10	1.12
26	.19	160.26	851.15	54.26	132.00	12.03	19.50	.77	.48	.49	.51	155.15
27	.00	48.79	5169.79	92.81	279.61	12.66	16.78	1.38	.74	.68	.84	.00
28	.00	1.60	14.07	479.74	129.80	7.06	2.67	.70	1.22	.83	.00	.00
29	.00	.43	2.01	103.38	430.66	24.14	5.03	1.16	2.42	1.10	1.40	.00
30	.00	.00	.00	3.73	17.94	302.35	8.03	9.49	19.75	9.64	5.14	.00
31	.00	31.03	22.52	5.85	47.13	63.00	103.22	7.46	8.50	4.45	2.73	.00
32	.00	.00	.00	.00	.01	11.10	1.89	354.53	175.40	145.13	17.91	.00
33	.00	.00	.00	.00	.00	2.03	.18	12.64	478.30	183.89	.58	.00
34	.00	.00	.00	.00	.01	.11	.01	3.35	67.51	293.58	.17	.00
35	.00	.00	.00	.00	.00	.19	31.09	64.36	4.38	14.71	388.16	.00
36	.92	.06	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.08	.46	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.35	.04	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.01	.00	.66	6.34	56.93	.00	.00
41	.00	.00	.00	.01	1.15	8.39	.27	1.72	4.44	3.05	.12	.00
42	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	126.14	263.35	6131.91	1014.00	1130.86	497.57	195.44	492.25	853.55	767.00	392.82	291.28

TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MURMS/M2 WITHIN RECEPTOR REGIONS

JANUARY 1978

EMITTER	37	38	39	40	41	42	43	44
1	.10	12.77	2.10	.79	3.10	8.99	114.74	11.69
2	.42	4.22	.54	.32	.32	.92	3.04	8.68
3	.00	11.53	1.66	1.78	4.40	12.92	343.29	.69
4	.13	4.75	1.22	.29	.85	2.26	15.90	28.59
5	.00	.33	.60	.23	.57	1.48	3.56	56.38
6	2.46	34.05	3.56	.55	2.43	9.99	23.31	1.58
7	.00	.00	.28	.31	.39	1.03	3.59	155.14
8	.11	1.24	.36	.07	.29	.58	2.29	10.09
9	.00	8.75	.51	.90	2.98	7.56	88.13	14.52
10	.00	4.23	8.80	5.31	57.40	61.96	11.41	.13
11	.00	.00	.00	.01	.17	.01	.04	23.80
12	9.31	.32	.10	.01	.04	.17	2.07	1.67
13	.79	.15	.04	.00	.03	.09	.60	1.24
14	.00	.00	.00	.36	.25	.41	5.59	43.06
15	.00	.00	.00	.00	.00	.00	.00	.07
16	.00	.00	.00	.00	.01	.01	.10	24.29
17	.00	.31	.69	5.03	8.64	20.99	19.43	.80
18	.00	.00	.00	.00	.02	.03	.18	.36
19	.00	.06	3.17	10.93	21.74	11.64	7.19	.01
20	.00	.02	2.87	40.88	100.40	28.64	9.74	.03
21	.00	.34	3.34	24.61	59.94	29.66	13.97	.24
22	.21	.05	.00	.00	.00	.01	.01	.07
23	.00	.03	.01	.00	.00	.02	.02	.02
24	.09	.04	.01	.00	.00	.01	.01	.10
25	22.43	3.65	.22	.09	.17	1.85	1.67	.00
26	42.01	137.80	10.83	.86	17.24	45.13	1.87	.16
27	.00	407.74	6.96	1.74	15.00	68.29	3.06	.15
28	.00	90.04	9.57	1.51	8.80	35.68	26.10	.42
29	.00	254.49	24.30	1.83	20.86	103.69	6.08	.18
30	.00	4.09	165.72	16.22	239.51	34.22	2.57	.01
31	19.05	19.87	39.64	8.04	29.68	25.03	2.20	.00
32	.00	.00	.01	20.25	.55	.29	.07	.00
33	.00	.00	.00	321.14	3.56	.13	.32	.00
34	.00	.00	.11	157.60	.80	.24	.00	.00
35	.00	.00	.00	.80	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	17.37	.00	.00	.00	.00	.00	.00
39	.00	.00	14.42	.00	.00	.00	.00	.00
40	.00	.00	.00	492.39	.00	.00	.00	.00
41	.00	.00	2.35	5.98	324.25	16.36	1.68	.02
42	.00	.00	.00	.00	.00	4.07	.00	.00
43	.00	.00	.00	.00	.00	.00	53.37	.00
44	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	97.12	1068.24	304.29	1170.62	924.53	554.54	767.26	438.46

SO₂ Ambient Concentration Unit Transfer Matrix
January 1978

JANUARY 1975

TOTAL CONTRIBUTIONS TO SO₂ CONCENTRATION UGMS/M³ WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	9	10	11	12
1	5.66	.07	3.60	.47	1.21	.11	.20	.04	.71	.02	.00
2	.62	10.69	.09	2.91	1.30	.36	1.01	1.74	.05	.36	.23
3	1.30	.00	11.63	.04	.26	.00	.04	.00	1.13	.02	.00
4	3.19	1.19	.44	12.92	3.29	.53	.83	.31	1.23	.15	.01
5	.35	.69	.13	1.02	12.46	.01	4.65	.21	.61	1.02	.00
6	2.20	.67	1.15	1.47	.16	5.34	.09	.21	1.01	.02	.10
7	.07	.60	.08	.06	1.74	.00	13.27	.03	.04	2.09	.00
8	.31	2.20	.07	.82	.99	.03	1.69	.53	.04	.43	.05
9	1.55	.00	2.92	.00	.67	.00	.20	19.46	.37	.05	.00
10	.12	.00	1.17	.02	.03	.00	.02	.00	.04	.01	.00
11	.00	.01	.00	.00	.03	.00	.61	.00	.00	.00	.00
12	.00	2.37	.05	.96	.14	.96	.06	.52	.01	.93	.00
13	.07	.79	.02	.23	.12	.14	.11	.31	.02	.02	4.47
14	.00	.00	.10	.00	.01	.00	.06	.00	.00	.05	2.29
15	.00	.00	.00	.00	.00	.00	.01	.00	.04	.01	.00
16	.00	.00	.01	.00	.02	.00	.01	.00	.00	1.32	.00
17	.00	.00	1.40	.00	.01	.00	.02	.00	.00	.00	.00
18	.00	.00	.00	.00	.01	.00	.10	.00	1.15	.01	.00
19	.00	.00	.64	.00	.00	.00	.02	.00	.01	1.23	.00
20	.00	.00	.24	.00	.03	.00	.00	.00	.00	.01	.00
21	.01	.00	.55	.00	.05	.00	.00	.09	.37	.01	.00
22	.00	.01	.00	.00	.00	.00	.02	.03	.36	.00	.00
23	.01	.01	.00	.01	.00	.01	.01	.00	1.39	.01	.00
24	.00	.05	.00	.02	.00	.00	.00	.00	.00	.01	.09
25	.06	.13	.05	.04	.01	.01	.01	.12	.00	.04	.00
26	.10	.19	.11	.06	.00	2.47	.01	.10	.00	.01	.13
27	.17	.21	.17	.06	.03	.48	.01	.06	.01	.00	.76
28	1.13	.23	1.47	.12	.04	.39	.01	.07	.67	.00	.04
29	.43	.10	.47	.33	.16	.54	.10	.03	1.11	.00	.01
30	.04	.00	.09	.03	.12	.14	.06	.08	4.10	.02	.00
31	.02	.06	.05	.03	.01	.02	.00	.05	4.15	.02	.00
32	.00	.00	.00	.00	.00	.11	.00	.00	.60	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.01
34	.00	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
37	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.11
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.24	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.11	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	21.21	20.09	27.22	22.38	22.94	11.88	23.48	27.76	27.55	16.94	6.30

EMITTER REGION	JANUARY 1978										UOMS/M3 WITHIN RECEPTOR REGIONS									
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	.00	.71	.01	.11	1.16	.05	.28	.04	.16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	.00	.10	.04	.12	.04	.28	.02	.00	.02	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.47	.00	.00	3.84	.02	.70	.05	.28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4	.00	.49	.08	.28	.20	.17	.07	.01	.05	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.00	.43	.19	.64	.12	.35	.01	.01	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	.11	.01	.02	.27	.05	.26	.05	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7	.00	.60	.25	1.51	.09	.42	.01	.01	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8	.00	.04	.06	.23	.03	1.06	.01	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	2.10	.00	.18	2.71	.03	.19	.04	.12	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10	.00	.07	.00	.00	2.21	.00	2.89	.51	2.75	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
11	.00	.15	1.86	2.76	.05	.38	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.35	.03	.01	.02	.02	.02	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
13	7.21	.01	.01	.02	.01	.05	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
14	.00	5.42	.00	.62	.82	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.01	14.81	.61	.00	.08	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.40	.60	6.81	.05	.06	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.62	.00	.00	15.52	.00	.86	.01	.32	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.02	.61	.29	.00	3.13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.06	.00	.00	1.21	.00	21.07	.65	1.24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.02	.00	.00	.30	.00	1.51	12.53	3.29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.00	.02	.00	.00	.36	.00	6.38	1.16	19.79	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	.35	.00	.00	.00	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.00	.06	.01	.00	.48	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.72	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.43	.00	.00	.00	.02	.00	.03	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.01	.00	.00	.04	.00	.03	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.01	.00	.00	.06	.00	.64	.13	.72	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.04	.01	.00	.44	.04	.82	.14	.44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.02	.01	.00	.24	.01	1.13	.29	1.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.01	.00	.00	.06	.00	.56	3.21	3.63	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.00	.00	.00	.00	.03	.00	.37	.72	.91	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
32	.00	.00	.00	.00	.00	.00	.01	.38	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.04	.00	.16	2.19	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.00	.00	.00	.00	.07	.19	.08	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.06	.09	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.03	.00	.22	1.48	1.47	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	9.16	12.64	18.64	14.41	29.96	6.75	38.86	24.23	37.92	6.66	2.05	4.44								

JANUARY 1978

TOTAL CONTRIBUTIONS TO SO2 CONCENTRATION UGMS/M3 WITHIN RECEPTOR REGIONS

EXITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.01	.09	1.00	.26	.06	.01	.02	.01	.01	.02	.00
2	.00	.02	.06	.07	.07	.01	.01	.00	.00	.00	.00	.00
3	.00	.00	.00	.12	.27	.09	.01	.03	.02	.03	.02	.00
4	.00	.01	.13	.36	.15	.03	.01	.01	.00	.01	.01	.00
5	.00	.00	.00	.01	.02	.02	.00	.01	.00	.00	.01	.00
6	.01	.16	1.12	6.07	.97	.10	.05	.01	.01	.01	.01	.00
7	.00	.00	.00	.00	.01	.01	.00	.01	.01	.01	.00	.00
8	.00	.01	.06	.13	.04	.01	.01	.00	.00	.00	.00	.00
9	.00	.00	.00	.07	.17	.06	.00	.04	.02	.02	.01	.00
10	.00	.00	.00	.15	.42	.04	.03	.04	.15	.11	.03	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.02	.66	.09	.07	.01	.00	.01	.00	.00	.00	.00	.11
13	.29	.03	.01	.01	.01	.00	.00	.00	.00	.00	.00	1.59
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.16	.06	.00	.02	.10	.06	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.06	.16	.00	.02	.30	.27	.00	.00
20	.00	.00	.00	.00	.05	.27	.02	.07	1.78	1.29	.01	.00
21	.00	.00	.00	.00	.11	.20	.02	.23	.23	.23	.00	.00
22	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.04
25	3.42	.42	.08	.30	.11	.00	.02	.00	.00	.00	.00	4.90
26	.01	5.07	26.89	1.71	4.16	.38	.62	.03	.02	.01	.02	.00
27	.00	1.68	166.12	3.12	8.85	.40	.53	.05	.02	.02	.03	.00
28	.00	.06	.44	15.19	4.11	.23	.09	.02	.04	.03	.03	.00
29	.00	.01	.06	3.28	13.67	.77	.16	.04	.08	.03	.04	.00
30	.00	.00	.00	.12	.57	9.60	.25	.30	.63	.29	.16	.00
31	.00	.96	.71	.16	1.49	2.00	3.27	.24	.27	.12	.06	.00
32	.00	.00	.00	.00	.00	.35	.06	11.26	5.55	4.29	.56	.00
33	.00	.00	.00	.00	.00	.06	.01	.39	15.22	5.54	.02	.00
34	.00	.00	.00	.00	.00	.00	.00	.10	2.14	8.65	.00	.00
35	.00	.00	.00	.00	.00	.01	.96	2.62	.14	.39	11.16	.00
36	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.55
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.02	.20	1.67	.00	.00
41	.00	.00	.00	.00	.04	.27	.01	.05	.14	.09	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	3.56	8.33	193.89	52.09	35.65	15.79	6.17	15.57	27.10	23.20	12.22	9.21

JANUARY 1978									
TOTAL CONTRIBUTIONS TO SO2 CONCENTRATION									
EMITTER	37	38	39	40	41	42	43	44	
1	.00	.40	.07	.02	.10	.28	.37	.10	.27
2	.01	.13	.02	.00	.01	.03	.10	.27	.02
3	.00	.37	.05	.05	.14	.10	.10	.10	.10
4	.00	.15	.04	.01	.03	.07	.50	.90	.02
5	.00	.01	.03	.01	.02	.05	.11	1.78	.00
6	.08	1.06	.12	.02	.08	.32	.74	.05	.00
7	.00	.00	.01	.01	.01	.03	.11	4.92	.00
8	.00	.04	.01	.00	.01	.02	.07	.32	.00
9	.00	.28	.02	.03	.09	.24	2.79	.46	.00
10	.00	.13	.28	.14	1.84	2.61	.38	.00	.00
11	.00	.00	.00	.00	.01	.00	.00	.76	.00
12	.29	.01	.00	.00	.00	.01	.07	.05	.00
13	.02	.00	.00	.00	.00	.00	.02	.04	.00
14	.00	.00	.00	.01	.01	.01	.18	1.40	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.01	.02	.14	.28	.67	.62	.03	.00
18	.00	.00	.00	.00	.00	.00	.01	.01	.00
19	.00	.00	.00	.00	.00	.00	.23	.32	.00
20	.00	.00	.09	.30	3.18	.91	.32	.00	.00
21	.00	.01	.11	.55	1.92	.94	.46	.00	.00
22	.01	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.71	.12	.01	.00	.01	.06	.05	.00	.00
26	1.33	5.64	.34	.02	.55	1.43	.06	.00	.00
27	.00	12.92	.22	.04	.04	2.16	.10	.00	.00
28	.00	2.85	.31	.04	.26	1.13	.62	.01	.00
29	.00	6.04	.76	.05	.67	3.28	.19	.01	.00
30	.00	.13	5.25	.43	7.63	1.08	.08	.00	.00
31	.60	.63	1.25	.19	.94	.79	.07	.00	.00
32	.00	.00	.00	.00	.02	.01	.00	.00	.00
33	.00	.00	.00	.00	8.61	.11	.00	.00	.00
34	.00	.00	.00	.00	4.64	.03	.01	.00	.00
35	.00	.00	.00	.00	.02	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	3.07	33.81	9.65	32.32	29.59	17.57	24.38	1.79	14.00

$\text{SO}_4^{=}$ Wet Deposition Unit Transfer Matrix

January 1978

JANUARY 1978
TOTAL CONTRIBUTIONS TO SO4 WET DEPOSITION MGMS/M2 WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	7.18	.26	2.32	1.32	2.56	.03	.79	.02	3.58	1.65	.15	.00
2	3.19	3.59	.09	5.61	4.05	.44	3.33	1.49	.23	.17	.84	.04
3	3.55	.01	6.18	.50	2.10	.00	.44	.01	3.73	1.90	.10	.00
4	6.16	1.10	2.51	10.95	5.31	.29	2.60	.34	1.40	1.13	.72	.00
5	2.68	.95	.83	10.28	10.95	.14	6.21	.31	.54	.96	4.71	.00
6	4.08	.65	3.41	2.90	.96	1.48	.61	.14	.91	4.68	.19	.02
7	1.08	1.97	1.59	3.86	4.14	.00	9.24	.01	1.98	1.50	5.97	.00
8	.79	2.89	.10	4.13	6.42	.07	6.65	4.28	.25	.27	1.27	.04
9	3.91	.00	3.25	.13	4.84	.00	1.10	.00	13.09	2.87	.21	.00
10	.57	.00	4.25	.17	.40	.00	.07	.00	2.01	4.73	.00	.00
11	.01	.08	1.09	.08	.19	.00	1.84	.00	.21	1.09	6.57	.00
12	.85	1.94	.05	2.99	1.03	.76	.26	.44	.14	.03	.06	.89
13	.31	1.74	.07	1.06	.51	.41	.25	1.13	.03	.08	.11	1.79
14	.00	.00	.54	.00	.04	.00	.14	.00	.05	.67	.00	.00
15	.00	.00	.00	.00	.00	.00	.19	.00	.00	.00	.00	.00
16	.02	.00	.78	.08	.00	.00	1.36	.03	.11	.80	.77	.00
17	.01	.00	2.74	.00	.15	.00	.08	.00	3.98	1.99	.00	.00
18	.00	.00	.06	.00	.04	.00	.16	.00	.05	.06	1.16	.00
19	.01	.00	7.53	.00	.00	.00	.14	.00	2.80	4.58	.00	.00
20	.11	.00	5.24	.00	.39	.00	.11	.03	2.79	5.14	.00	.00
21	.07	.00	6.22	.00	.56	.00	.17	.00	3.57	6.40	.00	.00
22	.63	.06	.26	.06	.03	.31	.02	.05	.02	.19	.00	.12
23	.03	.01	.01	.09	.09	.01	.09	.01	.00	.00	.03	.00
24	.41	.24	.03	.45	.09	.16	.03	.22	.00	.04	.00	.00
25	.98	.46	1.48	.09	.72	.29	.77	.24	.45	3.19	.66	.69
26	1.13	.75	.52	.75	.29	.38	.09	.02	.69	3.42	.15	.13
27	2.91	1.03	1.23	.78	1.23	.15	.04	.01	.75	4.91	.00	.04
28	1.77	.32	4.02	1.19	.79	.30	.63	.03	.75	4.02	.12	.00
29	.84	.13	2.76	.37	1.23	.03	.34	.05	.66	5.16	.27	.00
30	.50	.00	1.80	.05	.05	.05	.02	.03	.46	3.40	.00	.00
31	.35	.20	.80	.59	.08	.24	.11	.00	.15	3.60	.00	.03
32	.66	.00	2.74	.00	.00	.00	.00	.00	1.13	.55	.00	.00
33	.00	.00	2.26	.00	.00	.00	.00	.03	.44	.53	.00	.00
34	.00	.00	.25	.00	.00	.00	.00	.00	.00	.46	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.04	.00	.03	.00	.00	.00	.05
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.32	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.12	.00	.47	.00	.00	.00	.00	.00	.00	.23	.00	.00
42	.00	.00	.00	.00	.06	.00	.01	.00	.73	.81	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	45.74	18.80	68.09	46.33	49.83	8.24	38.12	8.80	47.69	71.20	31.46	4.03

		JANUARY 1978														TOTAL CONTRIBUTIONS TO SO4 NET DEPOSITION MGMS/M2 WITHIN RECEPTOR REGIONS			
EMITTER REGION		13	14	15	16	17	18	19	20	21	22	23	24						
1	.00	1.32	.25	.76	1.58	.01	.04	.13	.12	.00	.00	.00	.00						
2	.00	.28	1.15	.63	.00	.84	.00	.16	.04	.00	.00	.10	.00						
3	.00	1.85	.07	.51	2.95	.00	.04	.48	.63	.00	.00	.00	.00						
4	.00	1.13	.94	1.63	.51	.42	.00	.40	.06	.00	.00	.01	.00						
5	.00	.59	1.00	3.78	.07	.62	.17	.58	2.26	.00	.00	.00	.00						
6	.00	.53	.27	.18	2.23	.30	1.07	.54	1.69	.00	.00	.02	.00						
7	.00	.83	6.34	5.38	.54	.51	.74	.19	2.53	.00	.00	.00	.00						
8	.00	.36	1.91	1.06	.35	3.79	.07	.01	.19	.00	.00	.19	.00						
9	.00	4.41	.43	2.94	1.69	.00	.02	1.06	2.14	.00	.00	.00	.00						
10	.00	2.70	.02	.19	7.91	.00	2.70	2.53	4.06	.00	.00	.00	.00						
11	.00	1.51	9.56	3.47	1.37	.59	.72	.26	1.10	.00	.00	.00	.00						
12	.07	.07	.30	.14	.14	.29	.00	.01	.02	.00	.00	.05	.00						
13	1.36	.01	.02	.09	.00	1.58	.03	.09	.13	.05	.16	.05	.00						
14	.00	3.35	.06	1.72	1.03	.00	.12	.08	.63	.00	.00	.00	.00						
15	.00	2.81	9.79	2.80	.63	.87	.00	.00	.00	.00	.00	.00	.00						
16	.00	1.21	5.61	5.55	1.39	.00	.51	.27	1.09	.00	.00	.00	.00						
17	.00	5.51	.02	.16	9.72	.00	.31	1.76	2.53	.00	.00	.00	.00						
18	.00	.47	1.06	.35	.24	2.03	.07	.01	.00	.00	.00	.01	.00						
19	.00	1.96	.07	.00	7.93	.00	.00	2.44	2.00	.00	.00	.00	.00						
20	.00	.29	.02	.00	1.69	.00	12.87	6.89	12.70	.00	.00	.00	.00						
21	.00	.56	.15	.12	2.56	.00	6.92	2.53	9.23	.00	.00	.00	.00						
22	.20	.08	.01	.11	.30	.36	.27	.08	.67	.99	.00	.82	.16						
23	.00	.11	.02	.04	.00	.34	.00	.00	.00	.00	.00	.69	.00						
24	.40	.01	.01	.04	.01	.31	.00	.01	.06	.45	.37	.25	.00						
25	.25	.07	4.24	.59	.26	.97	.46	.14	.00	.00	.00	.00	.00						
26	.00	.18	.21	.16	.82	.01	6.47	2.52	1.23	.00	.00	.00	.00						
27	.00	.57	.15	.04	.68	.00	8.24	2.35	6.71	.00	.00	.00	.00						
28	.00	.41	.29	.06	3.97	.15	2.96	.64	2.91	.00	.00	.00	.00						
29	.00	.22	1.53	.18	2.66	.00	5.61	.74	3.68	.00	.00	.00	.00						
30	.00	.15	.00	.00	1.27	.00	5.66	8.67	10.51	.00	.00	.00	.00						
31	.00	.16	.00	.00	.64	.00	2.72	1.52	3.53	.00	.00	.00	.00						
32	.00	.05	.00	.00	.14	.00	.05	1.16	.25	.00	.00	.00	.00						
33	.00	.14	.00	.00	.63	.00	1.29	.74	1.40	.00	.00	.00	.00						
34	.00	.00	.00	.00	.17	.00	1.94	.68	2.22	.00	.00	.00	.00						
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
36	.01	.00	.00	.00	.00	.30	.00	.00	.00	.00	.00	.00	.00						
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
41	.00	.00	.00	.00	.56	.00	1.42	.02	.42	.00	.00	.00	.00						
42	.00	.04	.00	.00	.17	.00	.73	.60	2.91	.00	.00	.00	.00						
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
TOTAL	2.25	34.00	45.57	32.57	57.07	14.00	73.96	47.13	67.68	1.62	2.31	.41	.00						

JANUARY 1978

TOTAL CONTRIBUTIONS TO S04 WET DEPOSITION MGRMS/H2 WITHIN RECEPTOR REGIONS

EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.15	.19	1.34	3.90	.56	.41	.98	.13	.03	.03	.00
2	.00	.27	.11	.63	.67	.35	.25	1.01	.09	.04	.08	.00
3	.00	.02	.00	.05	6.95	1.07	.71	.70	.30	.13	.03	.00
4	.00	.10	.10	2.16	1.50	.76	.25	1.51	.30	.03	.03	.00
5	.00	.00	.00	.27	.24	.26	.01	.80	.19	.12	.02	.00
6	.00	.72	.68	4.48	2.25	1.79	.76	2.55	.53	.04	.06	.00
7	.00	.00	.00	.07	.11	.11	.00	.65	.34	.71	.03	.00
8	.00	.06	.14	.07	.71	.22	.15	1.02	.23	.02	.06	.00
9	.00	.00	.00	.18	7.94	.74	.31	1.48	.49	.27	.06	.00
10	.00	.00	.00	.00	2.23	3.32	.77	1.37	1.31	1.98	.01	.00
11	.00	.00	.00	.01	.00	.00	.00	.45	.05	1.15	.00	.00
12	.07	.63	.06	.23	.06	.06	.11	.18	.05	.01	.01	.00
13	.51	.46	.20	.16	.46	.13	.29	.06	.00	.00	.00	1.33
14	.00	.00	.00	.00	.07	.00	.00	.00	.20	.49	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	6.43	2.58	.00	.33	.37	.93	.00	.00
18	.00	.00	.00	.00	.00	.00	.52	.69	1.63	.00	.00	.00
19	.00	.00	.00	.00	.39	2.78	.70	.04	.03	.08	.00	.00
20	.00	.00	.00	.00	.10	.98	.36	.55	1.93	3.26	.01	.00
21	.00	.00	.00	.00	.06	1.52	.50	3.81	2.25	2.92	.03	.00
22	.25	.31	.26	.04	.08	.10	.06	2.09	2.29	1.87	.04	.00
23	.00	.00	.01	.00	.00	.00	.00	.04	.00	.00	.00	.52
24	.24	.15	.32	.12	.26	.04	.00	.00	.00	.00	.00	.36
25	1.15	1.63	.02	1.12	1.12	.27	1.34	.26	.02	.01	.01	.00
26	.00	1.65	4.78	1.03	5.32	1.74	2.11	4.28	.10	.02	.17	.00
27	.00	.53	12.38	1.84	6.36	1.80	2.52	7.44	.20	.22	.16	.00
28	.00	.65	.73	3.67	3.99	3.23	1.57	5.46	1.20	.16	.08	.00
29	.00	.01	.00	2.09	4.65	2.84	1.44	6.16	.73	.53	.08	.00
30	.00	.00	.00	.39	.07	6.41	.44	7.07	1.65	.31	.07	.00
31	.00	.07	.15	.57	3.67	3.41	1.47	3.71	.52	.38	.19	.00
32	.00	.00	.00	.00	.00	.22	.02	7.84	5.40	17.46	.03	.00
33	.00	.00	.00	.00	.00	.04	.04	2.65	3.71	5.82	.01	.00
34	.00	.00	.00	.00	.00	.06	.01	.66	.46	5.51	.04	.00
35	.00	.00	.00	.00	.00	.00	.16	11.19	.11	.42	1.26	.00
36	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.32
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.02	.00	.42	.04	.41	.00	.00
42	.00	.00	.00	.00	.03	.21	.06	.72	.23	.24	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	2.21	7.86	20.15	20.50	59.63	37.65	17.51	77.45	27.47	47.22	2.61	3.70

JANUARY 1976												
TOTAL CONTRIBUTIONS TO S04 NET DEPOSITION MGKMS/M2 WITHIN RECEPTOR REGIONS												
EMITTER	37	36	39	40	41	42	43	44				
1	.03	3.62	.60	.00	.17	.71	1.74	1.48				
2	.63	.32	.25	.01	.05	.09	.04	.44				
3	.00	3.54	.69	.01	1.02	4.72	6.06	1.24				
4	.14	.56	.99	.00	.14	.50	1.99	2.61				
5	.00	.12	.11	.00	3.89	3.38	.13	1.22				
6	1.56	2.21	2.06	.00	.32	2.60	2.43	.09				
7	.00	.00	.03	.00	2.57	2.96	1.74	3.29				
8	.41	.27	.05	.00	.06	.59	.06	.27				
9	.00	5.33	.07	.00	2.79	8.08	2.93	3.94				
10	.00	.37	2.86	.03	6.04	3.14	7.73	.12				
11	.00	.00	.00	.51	.63	1.53	.68	3.18				
12	1.07	.01	.10	.00	.03	.00	.01	.03				
13	.03	1.07	.16	.00	.49	.00	.00	.02				
14	.00	.00	.00	.16	.23	1.98	.67	3.03				
15	.00	.00	.00	.00	.00	.00	.00	.47				
16	.00	.00	.00	.61	.99	1.29	.31	4.60				
17	.00	1.63	1.52	.03	5.64	7.47	3.04	1.74				
18	.00	.00	.00	.02	.00	.01	.15	.42				
19	.00	.00	7.95	1.36	1.87	.66	6.21	.32				
20	.00	.00	.81	1.91	4.37	2.41	11.52	.03				
21	.00	.00	1.88	.23	1.80	.81	5.11	.04				
22	.32	.26	.00	.00	1.74	.30	.34	.07				
23	.00	.00	.00	.00	.00	.00	.02	.01				
24	.53	.14	.06	.00	.24	.03	.00	.01				
25	1.11	.21	.22	.00	.34	.85	.59	.00				
26	.27	5.01	.24	.00	4.93	6.34	.63	.02				
27	.00	9.14	1.12	.00	6.32	8.98	.45	.05				
28	.00	2.09	1.79	.00	.76	1.54	4.07	.02				
29	.00	2.26	1.31	.00	2.12	3.63	1.96	.01				
30	.00	.00	.32	.05	19.24	6.60	1.92	.01				
31	.00	1.91	1.32	.02	2.23	6.05	.36	.03				
32	.00	.00	.02	1.26	.39	.11	6.14	.00				
33	.00	.00	.00	8.58	.15	.05	2.91	.00				
34	.00	.00	.33	10.69	.18	.00	.00	.00				
35	.00	.00	.00	.16	.00	.00	.00	.00				
36	.00	.00	.00	.00	.00	.00	.00	.00				
37	.00	.00	.00	.00	.00	.00	.00	.00				
38	.00	.06	.00	.00	.00	.00	.00	.00				
39	.00	.00	.03	.00	.00	.00	.00	.00				
40	.00	.00	.00	3.20	.00	.00	.00	.00				
41	.00	.00	.00	.06	4.54	.76	.57	.02				
42	.00	.00	.00	.00	.00	.04	.00	.00				
43	.00	.00	.00	.00	.00	.00	.58	.00				
44	.00	.00	.00	.00	.00	.00	.00	.91				
TOTAL	6.13	40.16	27.14	28.91	76.36	78.18	76.29	24.39				

$\text{SO}_4^{=}$ Dry Deposition Unit Transfer Matrix

January 1978

JANUARY 1978											
TOTAL CONTRIBUTIONS TO 504 DRY DEPOSITION MGMS/M2 WITHIN RECEPTOR REGIONS											
EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11
1	7.35	.42	6.25	1.26	3.06	.36	1.68	.37	6.33	2.94	.42
2	2.53	10.20	1.42	5.53	5.24	1.78	4.98	4.69	1.94	1.11	2.59
3	2.67	.06	9.75	.25	1.49	.00	1.12	.09	3.21	2.88	.41
4	2.45	2.36	2.88	10.35	7.95	2.11	4.75	1.65	4.60	1.85	.00
5	1.25	3.28	1.04	3.83	10.89	.16	9.78	.35	2.29	.97	1.62
6	4.52	2.00	4.71	4.57	2.12	5.21	2.26	2.42	2.29	5.19	4.26
7	.45	6.65	.82	.86	3.04	.01	10.66	.07	1.41	.74	1.00
8	2.34	.00	1.56	3.84	4.33	.37	6.97	9.64	1.41	1.11	5.65
9	1.86	.00	4.39	.03	2.37	.00	1.71	.02	15.03	1.92	4.89
10	.66	.07	2.68	.25	.76	.02	.72	.05	.61	6.05	.54
11	.01	.13	.23	.03	.16	.00	1.15	.01	.13	.22	.59
12	1.61	4.73	.66	3.11	1.71	2.44	.76	2.86	1.23	.26	6.92
13	.74	4.41	.40	1.69	2.02	1.13	1.93	5.65	.26	.20	.29
14	.00	.00	.27	.00	.01	.00	.07	.00	.07	.22	1.08
15	.00	.00	.00	.00	.00	.00	.31	.00	.00	.04	6.89
16	.01	.00	.22	.08	.21	.00	.46	.00	.00	.00	.00
17	.00	.00	2.34	.00	.21	.00	.41	.00	.06	.16	.74
18	.00	.00	.06	.00	.07	.00	.26	.00	.73	2.16	.00
19	.00	.00	2.23	.00	.64	.00	.65	.00	.88	.03	.00
20	.00	.00	1.37	.04	.39	.00	.19	.00	.00	3.41	.77
21	.10	.00	1.97	.00	.94	.00	.72	.00	.74	2.47	.08
22	.19	.53	.13	.27	.35	.42	.98	1.63	1.02	3.81	.00
23	.21	.14	.08	.27	.06	.01	.06	.39	.16	.17	1.65
24	.27	1.94	.11	.83	.81	.55	1.44	2.73	.01	.07	.35
25	1.79	2.29	1.70	1.15	.63	9.73	.75	2.98	.26	.17	.88
26	2.39	3.25	2.75	1.93	3.30	2.42	1.76	2.92	.71	.39	.75
27	3.35	3.14	2.54	1.97	3.80	1.75	2.92	3.13	2.14	3.94	.73
28	3.60	1.97	4.84	4.46	2.90	1.17	3.36	1.16	2.64	5.72	5.84
29	3.20	1.01	2.33	2.75	2.63	.46	2.83	.83	1.20	6.93	.25
30	.34	.03	.96	.52	.41	.10	.02	.00	.96	10.01	.04
31	1.26	1.77	2.98	1.66	1.49	1.10	.56	.74	.49	8.43	.00
32	.01	.00	.41	.00	.04	.00	.02	.00	1.21	1.86	1.28
33	.00	.00	.28	.00	.02	.00	.04	.00	.35	4.34	.00
34	.00	.00	.03	.00	.00	.00	.04	.00	.12	.30	.13
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.16	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.06	.00
37	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.31	.00	.10	.00	.00	.00	.18	.02	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.65	.00
44	.00	.00	.08	.00	.00	.00	.00	.00	.00	.00	.00
45	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
46	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	49.54	52.82	66.81	52.55	64.42	31.36	66.29	42.38	54.82	80.55	46.29
											22.33

JANUARY 1978
TOTAL CONTRIBUTIONS TO SO₄ DRY DEPOSITION MGRS/M² WITHIN RECEPTION REGIONS

EMITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24
1	.00	3.61	.32	1.09	4.83	1.00	1.76	.58	1.39	.00	.00	.00
2	.00	1.50	1.12	2.58	1.71	3.01	.96	.43	.75	.00	.00	.00
3	.00	2.31	.12	.16	6.27	.56	2.40	.43	1.10	.00	.22	.00
4	.00	3.90	1.86	3.88	2.26	2.83	1.34	.48	1.02	.00	.00	.00
5	.00	3.29	2.55	6.11	1.45	2.17	.36	.24	.60	.00	.01	.00
6	.00	2.05	.67	.91	2.46	2.24	2.73	1.21	1.46	.00	.00	.00
7	.00	2.96	2.77	7.73	.88	1.74	.26	.19	.43	.00	.03	.00
8	.00	1.31	1.74	4.44	1.88	6.01	.61	.32	.69	.00	.00	.00
9	.00	6.61	.17	1.37	7.94	.63	1.14	.66	.96	.00	.73	.00
10	.00	.87	.20	.16	4.47	.15	6.11	2.07	3.56	.00	.00	.00
11	.00	1.22	5.54	8.50	.70	.84	.27	.21	.16	.00	.00	.00
12	.54	.65	.32	.59	.52	.74	.55	.21	.35	.00	.00	.00
13	9.07	.36	.53	1.07	.35	1.68	.16	.11	.17	.23	.29	.00
14	.00	4.47	.07	1.24	1.06	.00	.14	.07	.08	.00	.65	.00
15	.00	.33	16.71	2.89	.09	.21	.00	.00	.00	.00	.00	.00
16	.00	1.33	2.51	7.36	.62	.21	.00	.00	.00	.00	.00	.00
17	.00	2.15	.05	.11	11.74	.10	.17	.15	.09	.00	.00	.00
18	.00	.25	2.32	1.83	.07	2.99	1.35	.87	1.00	.00	.00	.00
19	.00	.64	.49	.09	.37	.03	.02	.02	.02	.00	.00	.00
20	.00	.39	.22	.14	3.77	.00	12.09	.00	.00	.00	.00	.00
21	.00	.54	.59	.16	1.66	.00	3.61	1.36	1.36	.00	.00	.00
22	1.84	.41	.67	.91	.29	.01	8.22	3.64	6.39	.00	.00	.00
23	.00	.03	.25	.54	.21	1.65	.09	.05	.10	.00	.00	.00
24	3.36	.43	.87	.25	.21	1.13	.14	.00	.02	.00	.00	.00
25	1.67	.50	.89	.54	.21	1.02	.00	.00	.00	.00	.00	.00
26	.00	1.66	.29	.29	.92	.35	2.63	.40	.10	.00	.00	.00
27	.00	2.45	.21	.33	2.47	.00	6.56	1.99	.78	.00	.00	.00
28	.00	1.55	1.01	.49	2.55	.51	7.60	1.49	7.38	.00	.00	.00
29	.00	1.13	1.10	.45	3.07	1.77	5.73	2.17	7.75	.00	.00	.00
30	.00	.37	.07	.03	1.80	.81	6.97	2.49	2.87	.00	.00	.00
31	.00	.74	.07	.02	1.45	.00	2.73	8.48	5.63	.00	.00	.00
32	.00	.15	.00	.02	2.45	.02	5.39	5.44	6.01	.00	.00	.00
33	.00	.12	.00	.01	.36	.00	.26	2.08	7.02	.00	.00	.00
34	.00	.01	.00	.00	.05	.00	.78	6.25	.42	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.36	.70	.54	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.09	.15	.42	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.06	.00	.00	.56	.05	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.51	1.77	1.77	.00	.00	.00
44	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
TOTAL	16.67	50.57	46.66	56.43	73.35	36.39	62.36	53.76	71.31	23.28	8.96	10.33

JANUARY 1976

TOTAL CONTRIBUTIONS TO SO₄ DRY DEPOSITION MMMS/M² WITHIN RECEPTOR REGIONS

EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.14	.86	2.76	1.82	.69	.22	.48	.27	.42	.52	.00
2	.00	.32	.77	1.58	1.58	.60	.44	.38	.41	.46	.52	.00
3	.00	.00	.02	.42	1.69	.73	.08	.47	.35	.60	.38	.00
4	.00	.17	.68	2.34	1.94	1.03	.43	.48	.30	.48	.70	.00
5	.00	.00	.00	.14	.38	.50	.06	.36	.19	.28	.45	.00
6	.00	.96	5.01	10.69	5.10	1.95	1.12	.69	.68	.39	.87	.00
7	.00	.00	.00	.01	.10	.34	.02	.31	.26	.37	.15	.00
8	.00	.14	.65	1.37	1.14	.38	.36	.45	.33	.43	.57	.00
9	.00	.00	.00	.35	1.65	.73	.03	.76	.54	.58	.22	.00
10	.00	.00	.00	.50	1.73	1.63	.35	.46	1.36	1.29	.37	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.16	.14	.00	.00
12	.25	.69	.86	.51	.27	.25	.34	.12	.17	.22	.00	.00
13	.71	.29	.30	.29	.29	.25	.31	.10	.00	.03	.21	6.66
14	.00	.00	.00	.00	.03	.00	.00	.00	.08	.12	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	1.54	.53	.06	.25	.88	1.10	.00	.00
19	.00	.00	.00	.00	.00	.01	.00	.01	.02	.02	.00	.00
20	.00	.00	.00	.00	.55	1.21	.16	.22	1.59	1.65	.00	.00
21	.00	.00	.00	.00	.96	1.37	.42	1.27	3.42	4.70	.00	.00
22	.94	.34	.22	.18	.36	.97	.32	.71	1.33	1.75	.07	.00
23	.00	.01	.08	.07	.06	.02	.13	.01	.00	.02	.02	.63
24	.00	.00	.00	.00	.00	.03	.02	.00	.00	.00	.00	.00
25	1.23	.24	.18	.17	.27	.09	.12	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
32	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	11.07	20.03	135.95	62.11	88.10	41.96	29.16	54.06	54.56	66.11	39.33	19.12

JANUARY 1976									
TOTAL CONTRIBUTIONS TO SO4 DRY DEPOSITION MGMS/M2 WITHIN RECEPTOR REGIONS									
EMITTER	37	38	39	40	41	42	43	44	
1	.06	2.44	.76	.60	1.15	1.99	6.05	2.15	
2	.56	2.16	.51	.45	.55	.93	1.55	2.99	
3	.00	2.26	.54	.85	.69	1.88	13.36	.52	
4	.21	1.84	.94	.73	.72	1.21	3.34	6.50	
5	.00	.15	.49	.46	.59	1.06	.80	6.95	
6	1.15	5.13	1.74	.68	1.24	2.47	3.84	1.07	
7	.00	.00	.20	.53	.36	.84	1.17	8.32	
8	.13	.79	.53	.65	.45	.57	1.91	2.56	
9	.00	2.33	.24	.85	.94	1.85	4.36	2.20	
10	.00	.75	1.33	1.26	3.54	3.37	1.47	.44	
11	.00	.00	.00	.15	.16	.14	.26	1.90	
12	1.66	.21	.16	.16	.13	.21	.63	.92	
13	.42	.22	.17	.05	.16	.21	.36	1.42	
14	.00	.00	.00	.24	.06	.24	.36	1.74	
15	.00	.00	.00	.00	.00	.00	.00	.11	
16	.00	.00	.00	.11	.09	.14	.16	1.48	
17	.00	.19	.36	1.57	1.37	2.05	2.31	.56	
18	.00	.00	.00	.01	.02	.05	.13	.20	
19	.00	.04	1.41	1.16	.94	1.86	1.42	.14	
20	.00	.01	.90	8.76	7.16	3.37	1.76	.21	
21	.00	.11	.59	2.99	1.49	1.96	1.75	.44	
22	.66	.56	.00	.02	.19	.25	.13	.46	
23	.00	.05	.03	.00	.01	.07	.06	.01	
24	.39	.20	.16	.00	.06	.16	.08	.73	
25	4.30	2.03	.69	.48	.46	2.31	1.47	.06	
26	3.04	16.46	2.76	2.20	5.43	9.19	2.17	1.02	
27	.00	23.41	2.57	1.61	4.62	11.88	1.87	1.69	
28	.00	8.90	2.13	1.04	2.22	5.26	3.75	1.02	
29	.00	15.46	2.46	1.10	2.59	8.09	1.89	.82	
30	.00	.45	6.95	3.52	12.35	3.12	1.01	.07	
31	2.10	6.22	5.26	4.87	6.91	5.49	3.06	.13	
32	.00	.00	.03	3.98	.79	.45	.76	.13	
33	.00	.00	.00	16.76	.44	.02	.24	.15	
34	.00	.00	.06	6.92	.15	.09	.00	.00	
35	.00	.00	.00	.67	.00	.00	.00	.00	
36	.00	.00	.00	.00	.00	.00	.00	.00	
37	.00	.00	.00	.00	.00	.00	.00	.00	
38	.00	.15	.00	.00	.00	.00	.00	.00	
39	.00	.00	.12	.00	.00	.00	.00	.00	
40	.00	.00	.00	.00	.00	.00	.00	.00	
41	.00	.00	.00	9.09	.00	.00	.00	.00	
42	.00	.00	.24	.82	5.06	1.34	.23	.06	
43	.00	.00	.00	.00	.00	.03	.00	.00	
44	.00	.00	.00	.00	.00	.00	.56	.00	
TOTAL	14.74	63.03	34.66	75.37	63.12	74.20	65.44	.58	49.78

$\text{SO}_4^{=}$ Ambient Concentration Unit Transfer Matrix

January 1978

JANUARY 1978
TOTAL CONTRIBUTIONS TO SO₄ CONCENTRATION UGRMS/M³ WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	.80	.07	.88	.19	.46	.06	.27	.06	.89	.46	.07	.00
2	.46	1.22	.23	.96	.82	.28	.79	.70	.32	.18	.42	.00
3	.39	.01	1.10	.04	.24	.00	.18	.02	.48	.43	.07	.14
4	.90	.36	.46	1.15	1.18	.33	.76	.26	.71	.30	.26	.00
5	.19	.36	.17	.59	1.27	.03	1.42	.05	.35	.16	.00	.01
6	.66	.52	.73	.70	.35	.62	.37	.59	.37	.82	.17	.02
7	.07	.32	.13	.14	.43	.00	1.19	.01	.22	.12	.65	.00
8	.37	1.01	.26	.60	.68	.06	1.09	1.23	.23	.18	.80	.10
9	.26	.00	.39	.00	.37	.00	.26	.00	1.64	.30	.09	.00
10	.11	.01	.39	.04	.13	.00	.12	.01	.10	.66	.10	.00
11	.00	.02	.04	.01	.03	.00	.16	.00	.02	.04	.74	.00
12	.26	.68	.11	.47	.26	.36	.12	.45	.20	.04	.05	.57
13	.12	.70	.07	.27	.33	.18	.32	.60	.04	.03	.18	1.05
14	.00	.00	.04	.00	.00	.00	.01	.00	.01	.04	.01	.00
15	.00	.00	.00	.00	.00	.00	.05	.00	.00	.00	.60	.00
16	.00	.00	.04	.01	.04	.00	.07	.00	.01	.03	.09	.00
17	.00	.00	.33	.00	.03	.00	.07	.00	.12	.31	.08	.00
18	.00	.00	.01	.00	.01	.00	.04	.00	.02	.00	.36	.00
19	.00	.00	.34	.00	.10	.00	.11	.00	.14	.51	.13	.00
20	.01	.00	.22	.00	.06	.00	.03	.00	.12	.39	.01	.00
21	.02	.00	.31	.00	.15	.00	.12	.00	.17	.57	.12	.00
22	.03	.09	.02	.05	.05	.07	.16	.27	.03	.03	.24	.14
23	.03	.02	.01	.05	.01	.00	.01	.06	.00	.01	.06	.00
24	.04	.32	.02	.14	.13	.09	.24	.45	.04	.03	.13	.28
25	.30	.38	.28	.19	.11	1.51	.13	.50	.12	.65	.12	.94
26	.39	.53	.45	.32	.36	.38	.29	.49	.36	.92	.06	.01
27	.55	.51	.42	.32	.63	.27	.49	.52	.44	1.11	.05	.00
28	.55	.32	.74	.71	.46	.17	.56	.19	.20	1.49	.24	.00
29	.51	.16	.37	.44	.47	.07	.47	.14	.16	1.22	.21	.00
30	.06	.00	.16	.08	.07	.02	.00	.00	.06	.26	.00	.00
31	.21	.29	.50	.28	.25	.18	.09	.12	.20	.71	.01	.02
32	.00	.00	.07	.00	.01	.00	.00	.00	.06	.05	.00	.00
33	.00	.00	.05	.00	.00	.00	.00	.00	.02	.03	.00	.00
34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.03
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.05	.00	.02	.00	.00	.00	.03	.10	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	7.52	7.62	9.61	7.77	9.74	6.70	10.02	6.51	7.91	12.22	6.97	3.35

JANUARY 1978
TOTAL CONTRIBUTIONS TO SO₄ CONCENTRATION UGRMS/H3 WITHIN RECEPTOR REGIONS

EMITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24
1	.00	.57	.05	.18	.75	.17	.28	.09	.23	.00	.00	.00
2	.00	.25	.18	.42	.18	.48	.16	.07	.12	.00	.04	.00
3	.00	.37	.02	.03	1.21	.09	.37	.07	.17	.00	.00	.00
4	.00	.63	.29	.63	.37	.08	.22	.06	.17	.00	.00	.00
5	.00	.39	.39	.99	.24	.34	.06	.04	.10	.00	.00	.00
6	.00	.34	.11	.15	.40	.37	.44	.20	.24	.00	.00	.00
7	.00	.47	.43	1.22	.14	.26	.04	.03	.07	.00	.00	.00
8	.00	.22	.27	.73	.23	.94	.10	.05	.11	.00	.12	.00
9	.00	1.01	.03	.22	1.20	.10	.19	.11	.15	.00	.00	.00
10	.00	.14	.03	.03	.65	.02	.56	.32	.47	.00	.00	.00
11	.00	.20	.87	1.30	.11	.12	.04	.03	.03	.00	.00	.00
12	.00	.11	.05	.10	.04	.12	.06	.04	.03	.04	.05	.00
13	1.14	.06	.08	.18	.06	.27	.03	.02	.03	.30	.11	.00
14	.00	.51	.01	.18	.14	.00	.04	.01	.01	.00	.00	.00
15	.00	.06	2.05	.46	.01	.03	.00	.00	.00	.00	.00	.00
16	.00	.20	.37	.93	.13	.03	.03	.02	.01	.00	.00	.00
17	.00	.33	.01	.02	1.28	.02	.19	.14	.15	.00	.00	.00
18	.00	.04	.36	.29	.04	.33	.00	.00	.60	.00	.01	.00
19	.00	.11	.08	.01	.58	.00	1.08	.20	.17	.00	.00	.00
20	.00	.06	.02	.02	.26	.00	.57	.89	.92	.00	.00	.00
21	.00	.09	.09	.03	.27	.00	1.09	.20	.60	.00	.00	.00
22	.29	.07	.11	.15	.05	.35	.02	.01	.02	1.75	.54	.49
23	.00	.00	.14	.03	.00	.25	.00	.00	.00	.00	.25	.00
24	.53	.07	.04	.09	.04	.18	.02	.00	.02	1.33	.23	.98
25	.26	.06	.15	.05	.15	.17	.44	.07	.17	.13	.03	.01
26	.00	.26	.04	.06	.41	.06	1.08	.33	1.20	.00	.00	.00
27	.00	.41	.04	.06	.42	.08	1.24	.24	1.26	.00	.00	.00
28	.00	.26	.16	.12	.49	.29	.92	.36	.46	.00	.00	.00
29	.00	.19	.17	.07	.29	.13	1.11	.40	.68	.00	.00	.00
30	.00	.06	.00	.01	.24	.00	.43	1.27	.84	.00	.00	.00
31	.00	.13	.01	.00	.41	.00	.86	.88	1.13	.00	.00	.00
32	.00	.03	.00	.00	.01	.00	.05	.33	.07	.00	.00	.00
33	.00	.02	.00	.00	.06	.00	.12	.95	.68	.00	.00	.00
34	.00	.00	.60	.00	.01	.00	.06	.11	.07	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00
36	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.01	.00	.03	.09	.01	.00	.00	.00
41	.00	.02	.00	.00	.03	.00	.06	.23	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.01	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	2.57	7.91	6.65	8.79	10.91	5.67	12.03	7.90	10.23	3.55	1.37	1.48

JANUARY 1978
TOTAL CONTRIBUTIONS TO SO4 CONCENTRATION UGRMS/M3 WITHIN RECEPTOR REGIONS

EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.02	.14	.42	.29	.11	.04	.08	.04	.07	.08	.00
2	.00	.05	.13	.24	.26	.10	.07	.06	.07	.07	.08	.00
3	.00	.00	.00	.06	.30	.12	.01	.12	.06	.09	.06	.00
4	.00	.03	.14	.37	.32	.17	.07	.08	.05	.08	.11	.00
5	.00	.00	.00	.02	.06	.08	.01	.06	.03	.04	.07	.00
6	.00	.15	.79	1.51	.81	.32	.18	.11	.11	.06	.14	.00
7	.00	.00	.00	.00	.00	.06	.00	.05	.04	.06	.02	.00
8	.00	.02	.14	.22	.19	.06	.06	.07	.05	.06	.09	.00
9	.00	.00	.00	.06	.27	.12	.00	.12	.09	.09	.03	.00
10	.00	.00	.00	.08	.27	.24	.06	.07	.22	.19	.06	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.03	.02	.00	.00
12	.04	.11	.14	.08	.05	.04	.05	.02	.03	.04	.03	.11
13	.43	.12	.05	.05	.05	.04	.05	.02	.00	.00	.03	1.04
14	.00	.00	.00	.00	.01	.00	.00	.00	.01	.02	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.25	.09	.01	.04	.14	.16	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.02	.02	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.15	.19	.03	.03	.25	.23	.00	.00
20	.00	.00	.00	.00	.09	.22	.07	.20	.49	.64	.01	.00
21	.00	.00	.00	.00	.15	.15	.05	.11	.21	.23	.01	.00
22	.15	.06	.04	.03	.06	.00	.02	.00	.00	.00	.00	.00
23	.00	.00	.01	.01	.01	.00	.00	.00	.00	.00	.00	.10
24	.20	.04	.03	.03	.05	.02	.02	.00	.00	.00	.00	.00
25	.78	.50	.04	.83	.42	.10	.12	.07	.08	.04	.13	1.29
26	.01	.95	4.34	1.13	1.94	.44	.69	.25	.14	.17	.22	.00
27	.00	.43	6.24	1.63	2.52	.48	.73	.41	.18	.15	.37	.00
28	.00	.06	.33	1.56	1.40	.38	.21	.17	.22	.10	.18	.00
29	.00	.02	.02	.95	1.59	.43	.23	.20	.37	.15	.17	.00
30	.00	.00	.00	.09	.24	1.09	.19	.38	.57	.46	.25	.00
31	.00	.38	1.14	.54	1.31	.97	1.13	.37	.27	.37	.30	.00
32	.00	.00	.00	.00	.00	.09	.04	.32	1.65	2.14	.68	.00
33	.00	.00	.00	.00	.00	.09	.02	.32	1.39	1.15	.02	.00
34	.00	.00	.00	.00	.00	.01	.00	.17	.62	.74	.01	.00
35	.00	.00	.00	.00	.00	.01	.31	2.28	.25	.85	2.60	.00
36	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.13
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.06	.12	.22	.00	.00
42	.00	.00	.00	.00	.03	.06	.02	.04	.06	.06	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	1.62	2.97	13.98	9.93	13.10	6.30	4.52	8.16	7.87	8.78	5.77	2.78

JANUARY 1978									
TOTAL CONTRIBUTIONS TO SO ₄ CONCENTRATION		UGMS/M3 WITHIN RECEPTOR REGIONS							
EMITTER	37	38	39	40	41	42	43	44	
1	.01	.39	.13	.09	.19	.32	.98	.34	
2	.10	.35	.15	.07	.09	.15	.26	.49	
3	.00	.36	.09	.12	.11	.30	1.75	.09	
4	.03	.30	.16	.11	.14	.20	.54	1.04	
5	.00	.02	.08	.07	.10	.18	.13	1.08	
6	.19	.81	.29	.10	.20	.40	.61	.13	
7	.00	.00	.03	.07	.06	.14	.19	1.17	
8	.13	.09	.09	.10	.06	.09	.32	.41	
9	.00	.36	.04	.13	.15	.30	.61	.35	
10	.00	.12	.21	.17	.51	.45	.23	.07	
11	.00	.00	.00	.02	.03	.02	.05	.28	
12	.27	.03	.03	.03	.04	.03	.14	.15	
13	.07	.04	.03	.01	.05	.04	.06	.24	
14	.00	.00	.00	.04	.01	.04	.05	.23	
15	.00	.00	.00	.00	.00	.00	.00	.02	
16	.00	.00	.00	.02	.01	.02	.03	.21	
17	.00	.03	.06	.22	.31	.36	.09	.09	
18	.00	.00	.00	.00	.00	.01	.02	.03	
19	.00	.01	.23	.14	.13	.29	.23	.02	
20	.00	.00	.15	1.14	1.05	.52	.26	.04	
21	.00	.02	.09	.32	.16	.29	.07	.07	
22	.11	.09	.00	.00	.03	.04	.02	.08	
23	.00	.01	.00	.00	.00	.01	.01	.00	
24	.06	.03	.03	.00	.01	.03	.01	.12	
25	.69	.33	.11	.08	.08	.38	.24	.01	
26	.45	2.46	.45	.32	.86	1.47	.36	.17	
27	.00	3.33	.42	.21	.75	1.89	.31	.28	
28	.00	1.36	.34	.15	.36	.83	.59	.17	
29	.00	2.31	.38	.15	.40	1.20	.31	.14	
30	.00	.07	.93	.49	1.72	.47	.16	.01	
31	.32	1.01	.82	.61	1.11	.88	.51	.02	
32	.00	.00	.01	.59	.13	.08	.13	.02	
33	.00	.00	.00	1.90	.07	.04	.04	.03	
34	.00	.00	.01	.83	.02	.01	.00	.00	
35	.00	.00	.00	.08	.00	.00	.00	.00	
36	.00	.00	.00	.00	.00	.00	.00	.00	
37	.00	.00	.00	.00	.00	.00	.00	.00	
38	.00	.00	.00	.00	.00	.00	.00	.00	
39	.00	.00	.00	.00	.00	.00	.00	.00	
40	.00	.00	.00	.57	.00	.00	.00	.00	
41	.00	.00	.04	.10	.39	.20	.04	.00	
42	.00	.00	.00	.00	.00	.00	.00	.00	
43	.00	.00	.00	.00	.00	.00	.00	.00	
44	.00	.00	.00	.00	.00	.00	.00	.00	
TOTAL	2.34	14.02	5.39	9.06	9.23	11.60	9.84	7.69	

SO₂ Wet Deposition Unit Transfer Matrix

July 1978

JULY 1978												
TOTAL CONTRIBUTIONS TO SO2 NET DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS												
MITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	156.66	.04	43.75	6.63	8.30	.65	.21	.00	51.81	22.10	.00	.00
2	2.73	155.99	.75	23.06	4.98	6.45	4.09	3.45	1.07	.23	.09	6.46
3	13.10	.00	155.17	.00	.21	.00	.02	.00	31.80	29.54	.00	.00
4	41.92	10.01	7.40	224.18	17.46	10.14	.55	.05	16.06	4.90	.37	.00
5	12.27	9.84	2.29	38.75	160.76	.02	30.51	1.99	14.34	3.69	2.05	.10
6	8.52	.62	4.86	10.29	.00	57.91	.00	.00	.15	3.49	.00	1.16
7	1.72	2.35	1.10	10.73	47.46	.01	179.49	2.37	5.53	.90	8.23	.05
8	2.42	40.27	.37	9.12	8.60	1.68	7.94	108.28	.44	.18	.45	4.05
9	16.34	.00	49.50	.00	2.48	.00	.51	.00	493.65	11.80	.00	.00
10	.17	.00	6.42	.00	.00	.01	.00	.00	.13	107.74	.00	.00
11	.00	.00	.13	.00	2.36	.00	22.04	.00	1.59	.02	117.16	.00
12	.20	6.78	.22	.25	.01	6.71	.00	.10	.02	.08	.00	76.82
13	.00	.07	.00	.02	.00	.51	.00	.00	.00	.00	.00	12.47
14	.00	.00	.12	.00	.26	.00	.46	.00	.42	.12	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.04	.00	.06	.00	4.78	.00	.18	.06	.00	.00
17	.00	.00	15.28	.00	.00	.00	.00	.00	.03	14.78	.00	.00
18	.05	.37	.05	.17	1.15	.00	4.91	.03	.21	.01	20.20	.00
19	.00	.00	.57	.00	.00	.00	.00	.00	.00	11.09	.00	.00
20	.00	.00	.14	.00	.00	.00	.00	.00	.01	.24	.00	.00
21	.00	.00	.30	.00	.00	.00	.00	.00	.00	9.33	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01
23	.01	.12	.00	.14	.10	.02	.74	1.36	.01	.00	.60	.01
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.34	.00	.00	.00	.00	.00	.36
26	.00	.00	.05	.00	.00	3.89	.00	.00	.00	.07	.00	.15
27	.01	.00	.21	.00	.00	2.77	.00	.00	.00	.18	.00	.00
28	10.06	.00	9.84	1.72	.08	2.52	.00	.00	3.08	26.51	.00	.00
29	3.43	.00	4.06	.00	.02	.05	.00	.00	2.08	20.57	.00	.00
30	.00	.00	.18	.00	.00	.00	.00	.00	.00	2.89	.00	.00
31	.00	.00	.00	.00	.00	.11	.00	.00	.00	.02	.00	.00
32	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.06
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.01	.00	.00	.00	.00	.00	.00	.41	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
43	.00	.00	.85	.00	.00	.00	.00	.00	.00	.01	.00	.00
44	.00	.00	.00	.00	.00	.00	.09	.00	.00	.00	.00	.00
TAL	269.62	226.46	343.67	325.07	274.32	93.80	256.33	117.65	624.63	272.96	179.93	102.09

JULY 1978

TOTAL CONTRIBUTIONS TO SO2 NET DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS

MITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24
1	.00	1.07	.00	.00	2.52	.00	.27	.70	3.90	.00	.00	.00
2	.10	.10	.07	.08	.06	.06	.02	.00	.00	.00	.00	.00
3	.00	3.20	.00	.06	21.46	.00	2.32	1.73	12.49	.00	.00	.00
4	.03	.80	.02	.19	.87	.00	.06	.05	.08	.00	.00	.00
5	.06	2.68	1.57	3.04	.16	.01	.01	.02	.21	.00	.00	.00
6	.00	.01	.00	.00	.48	.00	.14	.04	.34	.00	.00	.00
7	.04	7.49	2.78	5.80	.83	.21	.02	.01	.11	.00	.00	.00
8	.85	.11	.06	.13	.05	.71	.02	.00	.04	.03	.00	.00
9	.00	10.02	.00	.06	7.47	.00	.15	.97	7.47	.00	.00	.00
10	.00	.24	.00	.00	20.44	.00	28.56	3.28	33.71	.00	.00	.00
11	.00	4.29	36.52	27.24	.54	1.30	.05	.00	.02	.00	.00	.00
12	.00	.00	.00	.00	.01	.00	.00	.00	.00	.01	.00	.00
13	125.21	.00	.00	.00	.00	.00	.00	.00	.00	.20	.00	.02
14	.00	81.13	.00	3.53	11.51	.00	.19	.04	.53	.00	.00	.78
15	.00	.07	3.6.06	22.37	.00	1.68	.00	.00	.00	.00	.00	.00
16	.00	5.41	4.57	84.12	.63	.00	.05	.00	.17	.00	.00	.00
17	.00	5.36	.00	.00	235.12	.00	18.54	1.92	9.17	.00	.00	.00
18	.00	.61	10.59	4.06	.02	65.18	.01	.00	.02	.00	.00	.00
19	.00	.00	.00	.00	3.82	.00	227.03	1.93	25.43	.00	.00	.00
20	.00	.00	.00	.00	.01	.00	8.91	104.12	15.14	.00	.00	.00
21	.00	.00	.00	.00	.84	.00	18.29	23.20	253.30	.00	.00	.00
22	2.61	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.02	.58	.09	.00	.00	.00	.00	.00	.00	.00	.00
24	.05	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.06	.00	.00	.04	.03	.00	.00	.00
28	.00	.05	.00	.00	1.13	.00	1.18	.35	1.46	.00	.00	.00
29	.00	.09	.00	.00	.31	.00	.53	.89	3.24	.00	.00	.00
30	.00	.01	.00	.00	.07	.00	.48	11.93	15.84	.00	.00	.00
31	.00	.00	.00	.00	.00	.00	.02	.06	.01	.00	.00	.00
32	.00	.00	.00	.00	.00	.00	.01	5.33	.00	.00	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	5.96	.00	.00	.00	.00
34	.00	.00	.00	.00	.00	.00	.02	.54	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.80	.00	.00	.00	.00
41	.00	.00	.00	.00	.02	.00	.63	21.77	11.89	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.87	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
TAL	136.40	123.63	402.83	151.26	308.46	78.40	307.51	165.69	394.61	34.45	11.66	75.27

JULY 1978												
TOTAL CONTRIBUTIONS TO SO2 WET DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS												
MITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.02	.65	13.44	4.34	.59	.01	.16	.33	.04	.00	.00
2	.04	.09	.03	2.81	.21	.02	.01	.00	.00	.00	.00	.00
3	.00	.00	.00	.30	.48	.83	.00	.00	1.06	.00	.00	.04
4	.00	.15	.47	7.20	1.62	.17	.01	.02	.01	.42	.00	.00
5	.00	.02	.28	.24	.80	.07	.00	.02	.05	.00	.00	.00
6	.14	1.30	12.69	58.14	9.47	.88	.12	.06	.07	.00	.00	.00
7	.00	.00	.01	.05	.34	.03	.00	.00	.02	.01	.00	.09
8	.00	.05	.09	2.24	.31	.02	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	.02	.80	.00	.00	.42	.00	.00	.00
10	.00	.00	.00	1.24	3.32	11.47	.05	.89	1.27	.30	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	4.96	.00	.00
12	.21	.20	.11	.36	.08	.02	.01	.01	.00	.00	.00	.00
13	6.01	.18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.07
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	21.83
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.12	.00	.00	1.42	2.87	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.01	.12	.00	.04	1.31	.00	.00	.00
21	.00	.00	.00	.00	.09	.06	.00	.00	20.99	6.08	.00	.00
22	.74	.00	.00	.00	.00	1.00	.00	.01	4.13	16.97	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	8.56	.00	.00
24	1.41	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.12
25	57.46	3.69	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.07	62.76	230.30	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	19.03	3522.46	7.51	11.76	.49	6.13	.09	.00	.00	.00	.00
28	.00	.17	2.02	13.54	75.33	1.90	4.06	.28	.04	.01	.00	.00
29	.00	.12	.90	112.43	65.26	3.82	.28	.26	.11	.05	.00	.00
30	.00	.00	.00	9.24	148.55	14.47	.73	.49	.21	.03	.00	.00
31	.07	22.95	15.27	.61	1.09	147.98	1.11	13.06	4.13	.42	.00	.00
32	.00	.00	.00	.00	.00	5.41	36.88	4.45	.41	.17	.39	.00
33	.00	.00	.00	.00	.00	9.11	1.30	127.94	27.32	12.74	3.37	.00
34	.00	.00	.00	.00	.00	.00	.00	.66	168.18	63.52	.00	.00
35	.00	.00	.00	.00	.00	.39	8.32	.08	18.65	127.59	.00	.00
36	.61	.00	.00	.00	.00	.00	.00	1.47	.00	.02	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	60.03
38	.00	.00	.00	.03	.16	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.20	.02	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.21	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.03	2.40	15.01	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.63	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAL	66.97	130.75	3785.29	229.40	324.76	202.40	59.06	150.12	252.78	260.44	90.79	221.01

JULY		1978														WITHIN RECEPTOR REGIONS													
TOTAL CONTRIBUTIONS TO SO2 NET DEPOSITION MGRMS/M2																													
MITTER		37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
1	.00	5.81	.20	.08	.00	7.06	9.67	29.22	.34																				
2	.35	.17	.00	.00	.00	.00	.04	.92	.43																				
3	.00	.04	.00	.00	1.41	15.44	25.29	83.38	.30																				
4	.23	2.85	.22	.00	.00	.00	.32	3.53	1.26																				
5	.01	1.70	.01	.00	.00	.15	1.12	3.44	15.83																				
6	5.44	27.69	1.78	.00	.19	2.04	4.69	58.43	.00																				
7	.00	.63	.01	.01	.07	.02	.13	.60	.00																				
8	.26	.34	.07	.00	.29	9.31	18.15	55.75	1.80																				
9	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
10	.00	.44	2.78	.00	8.76	19.59	33.45	4.63	.00																				
11	.00	.00	.00	.00	.00	.00	.00	.13	43.38																				
12	.34	.07	.04	.00	.00	.00	.00	.14	.00																				
13	.18	.00	.00	.00	.00	.00	.00	.00	.00																				
14	.00	.00	.00	.00	.03	.09	.00	.00	.00																				
15	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
16	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
17	.00	.00	.00	.00	1.89	5.32	3.76	1.64	.00																				
18	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
19	.00	.00	.00	.00	24.46	2.19	10.43	.04	5.22																				
20	.00	.00	.00	.00	7.39	5.16	.15	.15	.00																				
21	.00	.00	.00	.00	5.50	21.39	5.90	.72	.00																				
22	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
23	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
24	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
25	.03	.00	.00	.00	.00	.00	.00	.00	.00																				
26	11.61	7.93	2.02	.00	.00	.05	.02	.04	.00																				
27	14.86	34.64	7.80	.00	.00	.06	.00	.18	.00																				
28	.00	61.87	3.75	.04	.49	6.52	8.37	.00	.00																				
29	.00	139.34	10.85	.01	1.46	17.11	1.90	.00	.00																				
30	.00	.01	102.66	.31	36.37	.83	.00	.00	.00																				
31	.55	1.58	2.89	.09	.00	.04	.00	.00	.00																				
32	.00	.00	.74	.00	.00	.00	.00	.00	.00																				
33	.00	.00	.00	.00	16.61	.00	.00	.00	.00																				
34	.00	.00	.00	.00	30.99	.00	.00	.00	.00																				
35	.00	.00	.35	.00	.00	.00	.00	.00	.00																				
36	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
37	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
38	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
39	.00	.00	8.07	.00	.00	.00	.00	.00	.00																				
40	.00	.00	.00	.00	160.97	.00	.00	.00	.00																				
41	.00	.00	.01	.03	123.06	.35	.01	.00	.00																				
42	.00	.00	.00	.00	.00	.00	1.30	.00	.00																				
43	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
44	.00	.00	.00	.00	.00	.00	.00	.00	.00																				
TAL	34.76	290.61	144.33	258.81	247.65	137.00	241.46	197.35	27.41																				

SO₂ Dry Deposition Unit Transfer Matrix

July 1978

JULY 1976

TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS

WITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	404.59	.51	136.25	13.09	22.32	5.25	.51	.00	135.41	43.26	.00	.01
2	12.14	404.34	1.59	60.43	15.60	19.62	11.78	29.31	1.53	.96	1.26	17.61
3	42.24	.00	471.23	.47	.24	.10	.00	.00	75.84	77.80	.00	.00
4	146.48	36.61	13.34	513.61	67.23	31.48	9.54	1.20	20.26	5.38	.14	1.32
5	54.31	27.43	6.45	66.27	482.47	1.20	127.46	9.51	17.72	3.31	10.82	.28
6	79.02	3.46	15.02	29.47	1.43	230.80	.01	.00	6.55	19.36	.00	2.76
7	17.83	8.52	3.40	18.37	128.16	.20	525.57	10.83	22.47	1.29	35.45	.09
8	7.66	112.95	.69	59.40	18.90	7.62	23.46	299.60	1.36	.51	2.72	7.40
9	35.93	.00	166.72	1.21	7.96	.01	.56	.00	808.09	27.95	.00	.00
10	.97	.00	27.76	.00	.00	.00	.00	.00	.33	309.66	.00	.00
11	.41	.00	.94	.00	11.07	.00	69.28	.00	8.97	.10	343.42	.00
12	1.86	38.99	.47	5.35	.57	33.41	.04	1.21	.50	.39	.00	163.53
13	.03	1.56	.01	.17	.03	5.06	.00	.02	.00	.01	.00	39.89
14	.00	.00	.71	.00	.50	.00	1.57	.00	3.61	.14	.00	.00
15	.00	.00	.00	.00	.00	.00	.24	.00	.04	.00	45.97	.00
16	.00	.00	.39	.00	.99	.00	17.71	.00	3.68	.07	13.00	.00
17	.03	.00	41.26	.00	.01	.00	.00	.00	6.05	60.31	.00	.00
18	.56	.29	.14	.74	3.65	.01	16.74	.40	1.10	.03	59.17	.00
19	.26	.00	4.49	.00	.00	.00	.00	.00	.08	32.79	.00	.00
20	.10	.00	10.51	.00	.00	.00	.00	.00	.99	9.31	.00	.00
21	.50	.00	10.81	.00	.00	.00	.00	.00	.73	28.07	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.04
23	.02	.53	.00	.14	.17	.03	.77	4.41	.02	.00	1.33	.40
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	2.45	.00	2.50	.00	.00	7.92	.00	.00	.00	.01	.00	2.87
27	1.99	.00	.00	.01	.00	25.59	.00	.00	.34	2.87	.00	.26
28	60.16	.00	4.60	.00	.00	17.33	.00	.00	.10	6.03	.00	.00
29	11.48	.00	62.18	1.29	.11	19.16	.00	.00	12.06	102.40	.00	.00
30	.02	.00	36.93	.00	.01	3.11	.00	.00	2.60	112.24	.00	.00
31	.00	.00	10.65	.00	.00	.00	.00	.00	.09	61.48	.00	.00
32	.00	.00	.08	.00	.00	.60	.00	.00	.00	1.77	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
34	.00	.00	.66	.00	.00	.00	.00	.00	.00	1.83	.00	.00
35	.00	.00	.19	.00	.00	.00	.00	.00	.00	.70	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.07	.00	.00	.00	.00	.00	.17
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.02	.00	3.16	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.17	5.10	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00
44	.00	.00	2.82	.00	.00	.00	.00	.00	.00	.08	.00	.00
TAL	881.08	635.21	1056.27	790.02	761.43	408.56	805.64	356.50	1130.73	920.36	514.28	236.65

JULY 1978													
TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MGRNS/M2 WITHIN RECEPTOR REGIONS													
EMITTER REGION	13	14	15	16	17	18	19	20	21	22	23	24	
1	.00	6.59	.00	.02	13.20	.00	2.99	2.08	7.00	.00	.00	.00	
2	.18	.37	.16	.84	.20	.24	.09	.07	.10	.00	.00	.00	
3	.00	11.87	.00	.02	96.27	.00	20.37	6.84	22.54	.00	.00	.00	
4	.01	2.86	.01	1.23	2.84	.00	.50	.26	.53	.00	.00	.00	
5	.03	6.14	1.74	8.93	.90	.32	.19	.14	.45	.00	.00	.00	
6	.00	1.14	.00	.00	1.52	.00	1.40	.55	2.41	.00	.00	.00	
7	.01	23.44	3.26	15.82	2.72	.86	.34	.05	.18	.00	.00	.00	
8	.65	.24	.27	1.10	.13	2.99	.08	.09	.13	.14	2.37	.01	
9	.00	32.05	.00	.05	47.16	.00	5.61	5.10	14.39	.00	.00	.00	
10	.00	2.09	.00	.00	76.19	.00	203.62	13.37	107.24	.00	.00	.00	
11	.00	11.92	48.48	90.20	1.56	4.03	.16	.00	.03	.00	.00	.00	
12	10.02	.06	.00	.00	.05	.00	.02	.01	.03	.02	.00	.00	
13	246.61	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
14	.00	226.22	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	1.62
15	.00	4.52	465.87	52.59	37.16	.00	.34	.02	.18	.00	.00	.00	
16	.00	27.39	8.47	256.63	1.88	.91	.00	.00	.00	.00	.00	.00	
17	.00	18.76	.00	.00	632.35	.02	.07	.00	.02	.00	.00	.00	
18	.00	1.36	14.77	11.33	.19	120.59	.01	.00	.01	.00	.00	.00	
19	.00	1.01	.00	.00	39.55	.00	790.74	17.49	70.23	.00	.00	.00	
20	.00	.60	.00	.00	16.62	.00	105.22	590.43	71.20	.00	.00	.00	
21	.00	.45	.00	.00	17.72	.00	249.26	122.44	809.23	.00	.00	.00	
22	11.14	.00	.00	.00	.00	.00	.00	.00	.00	128.67	.20	30.23	
23	.00	.03	.79	.29	.00	24.62	.00	.00	.00	.28	60.64	.00	
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.70	.00	168.20	
25	3.07	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
26	.00	.09	.00	.00	.65	.00	.08	.08	.16	.00	.00	2.04	
27	.00	.08	.00	.00	1.45	.00	.20	.27	.31	.00	.00	.00	
28	.00	1.83	.00	.00	4.20	.00	4.99	2.18	10.34	.00	.00	.00	
29	.00	.86	.00	.00	4.64	.00	4.29	3.36	16.16	.00	.00	.00	
30	.00	.30	.00	.00	7.40	.00	16.72	33.81	101.88	.00	.00	.00	
31	.00	.00	.00	.00	.03	.00	.37	.94	2.15	.00	.00	.00	
32	.00	.00	.00	.00	.00	.00	1.05	27.43	4.36	.00	.00	.00	
33	.00	.01	.00	.00	6.65	.00	10.44	42.04	4.40	.00	.00	.00	
34	.00	.02	.00	.00	1.62	.00	3.79	2.98	.87	.00	.00	.00	
35	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	
36	1.34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
41	.00	.06	.00	.00	.67	.00	.96	.73	.17	.00	.00	.00	
42	.00	.00	.00	.00	2.41	.00	22.48	65.54	76.08	.00	.00	.00	
43	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	
44	.00	.00	.00	.00	.19	.00	.00	.00	.00	.00	.00	.00	
TOTAL	273.14	365.98	543.62	451.64	1018.47	154.59	1561.29	951.72	1345.23	131.16	63.83	202.15	

JULY 1976												
TOTAL CONTRIBUTIONS TO SO2 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTION REGIONS												
EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.06	1.31	53.05	11.44	1.64	.03	.09	.50	.20	.00	.36
2	.02	.35	.93	5.10	.95	.09	.02	.00	.01	.00	.00	.00
3	.00	.00	.01	3.36	1.42	1.22	.00	.07	2.14	1.82	.00	.01
4	.00	.39	2.49	23.77	4.70	.42	.04	.00	.03	.02	.00	.00
5	.00	.02	.18	7.80	2.25	.18	.00	.00	.04	.01	.00	.00
6	.17	2.63	20.39	242.74	36.86	2.27	.36	.06	.07	.01	.00	.00
7	.00	.01	.07	3.11	1.09	.07	.00	.00	.02	.02	.00	.12
8	.03	.20	.82	2.80	.63	.09	.02	.00	.02	.01	.00	.00
9	.00	.00	.00	.12	.06	.54	.00	.01	1.59	.82	.00	.00
10	.00	.00	.00	1.71	14.15	32.05	.20	.96	4.09	13.92	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
12	.39	.94	2.23	3.71	.99	.06	.03	.01	.00	.00	.00	.00
13	13.59	1.34	.10	.15	.03	.00	.01	.00	.00	.00	.00	2.45
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	92.67
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.04	.00	.00	4.46	9.70	.00	.00
18	.00	.00	.00	.15	.02	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.06	.05	.00	.00	7.44	47.35	.00	.00
20	.00	.00	.00	.00	.08	4.01	.00	.19	141.96	62.47	.00	.00
21	.00	.00	.00	.03	2.20	1.29	.00	.04	34.89	29.37	.00	.00
22	.87	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.63
23	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00
24	2.66	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	142.89	22.03	.71	.02	.06	.00	.00	.00	.00	.00	.00	.00
26	.23	190.28	811.68	72.46	72.06	4.02	.41	.00	.00	.00	.00	294.93
27	.00	49.52	6216.17	178.37	259.37	9.92	17.34	.14	.00	.02	.00	.00
28	.00	.41	6.98	634.54	175.80	7.27	13.07	.35	.15	.03	.00	.00
29	.00	.36	5.30	144.92	595.14	31.33	.38	.17	.16	.10	.00	.00
30	.00	.00	.00	.06	9.97	408.58	1.46	.41	.43	.17	.00	.00
31	.22	60.57	65.59	8.04	19.23	29.72	3.22	11.88	8.07	2.03	.01	.00
32	.00	.00	.00	.00	.00	24.18	100.24	10.05	1.15	.45	.21	.00
33	.00	.00	.00	.00	.00	.00	.00	4.46	659.35	36.29	9.24	.00
34	.00	.00	.00	.00	.00	.00	.00	.20	61.57	424.37	.01	.00
35	.00	.00	.00	.00	.00	.98	48.22	9.82	.02	.30	380.11	.00
36	1.87	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.08	.46	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.35	.04	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.15	.00	.00	4.27	65.01	.00	.00
42	.00	.00	.00	.00	.01	.00	.01	.12	8.08	3.19	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	162.96	329.14	7136.96	1386.10	1209.25	572.20	186.29	558.19	1071.53	927.00	389.61	510.48

JULY 1978									
TOTAL CONTRIBUTIONS TO S02 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS									
EMITTER	37	38	39	40	41	42	43	44	
1	.00	9.88	.71	.21	8.63	20.23	115.74	2.15	
2	1.49	.86	.11	.01	.11	.45	1.36	2.08	
3	.00	.09	.18	4.20	18.86	36.22	352.33	.08	
4	2.17	5.42	.36	.05	.53	1.91	12.67	8.07	
5	.02	2.74	.10	.01	.58	.94	4.05	32.36	
6	4.11	60.66	3.00	.02	1.10	11.20	7.11	.07	
7	1.05	.02	.02	.07	.16	.37	2.86	167.97	
8	.61	.62	.14	.01	.15	.24	.87	1.42	
9	.06	.03	.00	.90	11.84	20.21	338.56	5.86	
10	.00	.72	8.40	35.46	36.86	144.33	24.16	.00	
11	.00	.00	.00	.03	.00	.00	1.36	102.50	
12	4.37	1.50	.05	.00	.01	.09	.19	.02	
13	2.72	.06	.00	.00	.00	.00	.00	.00	
14	.00	.00	.00	.06	.02	.00	.12	46.89	
15	.00	.00	.00	.00	.00	.00	.00	12.35	
16	.00	.00	.00	.02	.00	.00	.24	121.62	
17	.00	.00	.00	.25.90	4.57	9.63	6.96	.05	
18	.00	.04	.00	.00	.01	.01	.13	8.65	
19	.00	.00	.00	161.78	8.57	12.38	.66	.00	
20	.00	.00	.13	50.18	82.89	8.63	13.10	.00	
21	.00	.00	.00	30.66	88.03	49.24	6.20	.00	
22	.00	.00	.00	.00	.00	.00	.00	.00	
23	.00	.01	.00	.00	.00	.00	.00	.00	
24	.00	.00	.00	.00	.00	.00	.00	.22	
25	2.59	.01	.05	.00	.00	.01	.00	.00	
26	33.21	50.04	4.53	.03	.15	1.35	2.22	.00	
27	7.59	165.06	10.75	.04	.47	3.11	2.75	.00	
28	.12	131.75	6.55	.29	5.27	37.29	15.89	.01	
29	.03	372.02	23.03	.36	10.86	74.82	15.37	.00	
30	.00	.59	297.22	3.19	92.03	170.32	9.28	.00	
31	4.10	14.38	30.68	.07	2.49	4.57	.01	.00	
32	.00	.00	.35	.27	12.76	.04	.00	.00	
33	.00	.00	.00	123.76	1.61	.00	.02	.00	
34	.00	.00	.00	177.15	.26	.00	.00	.00	
35	.00	.00	.29	.00	.00	.00	.00	.00	
36	.00	.00	.00	.00	.00	.00	.00	.00	
37	.00	.00	.00	.00	.00	.00	.00	.00	
38	.00	17.39	.00	.00	.00	.00	.00	.00	
39	.00	.00	14.47	.00	.00	.00	.00	.00	
40	.00	.00	.00	.00	.00	.00	.00	.00	
41	.00	.00	.00	635.89	.00	.00	.00	.00	
42	.00	.00	2.59	1.97	446.34	6.02	3.17	.00	
43	.00	.00	.00	.00	.00	4.10	.00	.00	
44	.00	.00	.00	.00	.00	.00	67.36	.00	
TOTAL	63.15	854.91	403.71	1252.60	835.19	617.71	1004.73	79.36	591.75

SO₂ Ambient Concentration Unit Transfer Matrix

July 1978

JULY 1978												
TOTAL CONTRIBUTIONS TO SO2 CONCENTRATION UGMS/MS WITHIN RECEPTOR REGIONS												
EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	10.25	.01	3.44	.33	.57	.13	.01	.00	3.43	1.10	.00	.00
2	.31	10.27	.04	2.03	.39	.50	.30	.74	.04	.02	.03	.45
3	1.07	.00	11.93	.01	.01	.00	.00	.00	1.93	1.97	.00	.00
4	3.69	.92	.34	13.05	1.70	.79	.24	.03	.51	.14	.00	.00
5	1.37	.70	.16	2.20	12.25	.03	3.21	.24	.46	.09	.27	.03
6	1.98	.09	.38	.75	.04	5.82	.00	.00	.16	.49	.07	.00
7	.45	.22	.09	.47	3.26	.01	13.31	.27	.57	.03	.90	.00
8	.19	2.87	.02	1.00	.48	.19	.60	7.63	.03	.01	.07	.19
9	.91	.00	4.71	.03	.20	.00	.01	.00	20.60	.71	.00	.00
10	.02	.00	.70	.00	.00	.00	.00	.00	.01	.78	.00	.00
11	.01	.00	.02	.00	.26	.00	.00	.00	.23	.00	.00	.00
12	.05	.98	.01	.13	.01	.84	1.76	.00	.01	.00	8.70	.00
13	.00	.04	.00	.00	.00	.13	.00	.03	.01	.01	.00	.00
14	.00	.00	.02	.00	.01	.00	.00	.00	.00	.00	.00	4.17
15	.00	.00	.00	.00	.01	.00	.04	.00	.10	.00	.00	1.01
16	.00	.00	.01	.00	.00	.00	.01	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.02	.00	.45	.00	.00	.00	1.21	.00
18	.00	.00	1.04	.00	.00	.00	.00	.00	.09	.00	.33	.00
19	.01	.01	.00	.02	.09	.00	.00	.00	.15	1.52	.00	.00
20	.01	.00	.11	.00	.00	.00	.42	.01	.03	.00	1.50	.00
21	.00	.00	.26	.00	.00	.00	.00	.00	.00	.83	.00	.00
22	.00	.00	.27	.00	.00	.00	.00	.00	.02	.23	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.71	.00	.00
24	.00	.01	.00	.00	.00	.00	.02	.11	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03	.01
26	.00	.00	.00	.00	.00	.20	.00	.00	.00	.00	.00	.00
27	.00	.00	.06	.00	.00	.64	.00	.00	.01	.00	.00	.07
28	.05	.00	.12	.00	.00	.44	.00	.00	.00	.07	.00	.01
29	1.51	.00	1.56	.03	.00	.48	.00	.00	.00	.15	.00	.00
29	.29	.00	.93	.00	.00	.08	.00	.00	.30	2.58	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.07	2.94	.00	.00
31	.00	.00	.27	.00	.00	.00	.00	.00	.00	1.54	.00	.00
32	.00	.00	.00	.00	.00	.02	.00	.00	.00	.04	.00	.00
33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.08	.00	.00	.00	.00	.00	.00	.13	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.07	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	22.26	16.12	26.68	20.08	19.32	10.29	20.39	9.07	28.78	23.22	13.05	6.02

		JULY 1978												UGMS/M3 WITHIN RECEPTOR REGIONS											
TOTAL CONTRIBUTIONS TO SO2 CONCENTRATION																									
EMITTER REGION		13	14	15	16	17	18	19	20	21	22	23	24	13	14	15	16	17	18	19	20	21	22	23	24
1		.00	.17	.00	.00	.33	.00	.07	.05	.18	.00	.00	.00												
2		.00	.01	.00	.02	.01	.01	.00	.00	.00	.00	.00	.00												
3		.00	.30	.00	.00	2.43	.00	.51	.17	.58	.00	.00	.00												
4		.00	.07	.00	.03	.07	.00	.01	.01	.01	.00	.00	.00												
5		.00	.16	.04	.23	.02	.01	.00	.00	.01	.00	.00	.00												
6		.00	.03	.00	.00	.04	.00	.04	.01	.06	.00	.00	.00												
7		.00	.59	.06	.50	.07	.02	.01	.00	.00	.00	.00	.00												
8		.00	.01	.01	.03	.00	.08	.00	.00	.00	.00	.00	.00												
9		.00	.81	.00	.00	1.19	.00	.14	.00	.00	.00	.00	.00												
10		.00	.05	.00	.00	1.92	.00	5.11	.34	2.71	.00	.00	.00												
11		.00	.30	1.25	2.29	.04	.10	.00	.00	.00	.00	.00	.00												
12		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
13		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
14		.00	5.74	.00	.17	.94	.00	.01	.00	.00	.00	.00	.00												
15		.00	.11	12.04	1.34	.01	.03	.00	.00	.00	.00	.00	.00												
16		.00	.69	.22	6.51	.05	.00	.00	.00	.00	.00	.00	.00												
17		.00	.46	.00	.00	15.99	.00	2.89	.21	.57	.00	.00	.00												
18		.00	.03	.36	.29	.00	.06	.00	.00	.00	.00	.00	.00												
19		.00	.03	.00	.00	.94	.00	19.97	.44	1.77	.00	.00	.00												
20		.00	.01	.00	.00	.42	.00	2.64	14.84	1.79	.00	.00	.00												
21		.00	.01	.00	.00	.44	.00	6.25	3.08	20.47	.00	.00	.00												
22		.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00												
23		.00	.00	.02	.00	.00	.62	.00	.00	.00	.00	.00	.00												
24		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
25		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
26		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
27		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
28		.00	.05	.00	.00	.00	.00	.01	.01	.01	.00	.00	.00												
29		.00	.02	.00	.00	.12	.00	.11	.05	.26	.00	.00	.00												
30		.00	.01	.00	.00	.19	.00	.42	.08	.41	.00	.00	.00												
31		.00	.00	.00	.00	.00	.00	.01	.96	2.56	.00	.00	.00												
32		.00	.00	.00	.00	.00	.00	.03	.69	.11	.00	.00	.00												
33		.00	.00	.00	.00	.17	.00	.26	1.05	.11	.00	.00	.00												
34		.00	.00	.00	.00	.04	.00	.09	.07	.02	.00	.00	.00												
35		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
36		.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
37		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
38		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
39		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
40		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
41		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
42		.00	.00	.00	.00	.00	.00	.56	1.65	1.91	.00	.00	.00												
43		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00												
44		.00	.05	.00	.05	.00	.00	.00	.00	.00	.00	.00	.00												
TOTAL		6.97	9.76	14.05	11.46	25.70	3.93	39.31	23.93	33.99	3.28	1.60	5.02												

JULY 1978												
TOTAL CONTRIBUTIONS TO SO2 CONCENTRATION UGMS/M3 WITHIN RECEPTOR REGIONS												
EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.00	.03	1.34	.29	.04	.00	.00	.01	.00	.00	.00
2	.00	.01	.02	.13	.02	.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	.08	.04	.03	.00	.00	.05	.04	.00	.00
4	.00	.01	.06	.60	.12	.01	.00	.00	.00	.00	.00	.00
5	.00	.00	.00	.20	.06	.00	.00	.00	.00	.00	.00	.00
6	.00	.07	.52	6.13	.93	.06	.01	.00	.00	.00	.00	.00
7	.00	.00	.00	.08	.03	.00	.00	.00	.00	.00	.00	.00
8	.00	.01	.02	.07	.02	.00	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.01	.00	.00	.04	.02	.00	.00
10	.00	.00	.00	.04	.36	.81	.01	.02	.10	.34	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.01	.02	.06	.09	.02	.00	.00	.00	.00	.00	.00	.00
13	.34	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.06
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.33
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.00	.11	.23	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.10	.00	.00	.19	1.16	.00	.00
21	.00	.00	.00	.00	.06	.03	.00	.00	3.56	1.52	.00	.00
22	.02	.00	.00	.00	.00	.00	.00	.00	.88	.68	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02
24	.07	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	3.62	.55	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.01	4.63	20.43	1.82	1.81	.10	.44	.00	.60	.00	.00	7.52
27	.00	1.25	158.08	4.48	6.34	.25	.33	.01	.00	.00	.00	.00
28	.00	.01	.16	15.97	4.43	.18	.01	.00	.00	.00	.00	.00
29	.00	.01	.13	3.63	14.98	.60	.04	.01	.01	.00	.00	.00
30	.00	.00	.00	.00	.25	10.32	.06	.31	.20	.05	.00	.00
31	.01	1.55	1.67	.20	.48	.75	2.53	.25	.03	.01	.01	.00
32	.00	.00	.00	.00	.00	.61	.03	13.04	3.29	.91	.22	.00
33	.00	.00	.00	.00	.00	.00	.00	.11	16.58	5.61	.00	.00
34	.00	.00	.00	.00	.00	.00	.00	.25	1.56	10.31	.00	.00
35	.00	.00	.00	.00	.00	.02	1.22	.25	.00	.01	9.57	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.03
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.30	.00	.00	.11	1.65	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.20	.07	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	4.13	8.35	181.23	34.88	30.44	14.46	4.71	14.03	26.94	22.63	9.80	12.95

JULY 1978												
TOTAL CONTRIBUTIONS TO SO ₂ CONCENTRATION												
EMITTER	37	38	39	40	41	42	43	44	WITHIN RECEPTOR REGIONS			
1	.00	.25	.02	.01	.22	.52	2.92	.44				
2	.04	.02	.00	.00	.00	.01	.03	.05				
3	.00	.00	.00	.09	.48	.94	8.68	.00				
4	.06	.14	.01	.00	.01	.05	.32	.20				
5	.00	.07	.00	.00	.01	.03	.10	.82				
6	.11	1.53	.06	.00	.03	.28	.18	.00				
7	.00	.03	.00	.00	.00	.01	.07	4.24				
8	.02	.02	.00	.00	.00	.01	.02	.04				
9	.00	.00	.00	.02	.31	.53	8.50	.15				
10	.00	.02	.21	.80	.93	3.64	.61	.00				
11	.00	.00	.00	.00	.00	.00	.03	2.61				
12	.11	.04	.00	.00	.00	.00	.00	.00				
13	.07	.00	.00	.00	.00	.00	.00	.00				
14	.00	.00	.00	.00	.00	.00	.00	.00				
15	.00	.00	.00	.00	.00	.00	.00	.00				
16	.00	.00	.00	.00	.00	.00	.00	.31				
17	.00	.00	.00	.00	.00	.00	.01	3.07				
18	.00	.00	.00	.53	.12	.25	.17	.00				
19	.00	.00	.00	.00	.00	.00	.00	.22				
20	.00	.00	.00	3.88	.22	.31	.02	.00				
21	.00	.00	.00	1.20	2.06	.22	.33	.00				
22	.00	.00	.00	.68	2.23	1.24	.16	.00				
23	.00	.00	.00	.00	.00	.00	.00	.00				
24	.00	.00	.00	.00	.00	.00	.00	.01				
25	.00	.00	.00	.00	.00	.00	.00	.00				
26	.84	1.26	.12	.00	.00	.00	.00	.00				
27	.21	4.15	.28	.00	.00	.03	.06	.00				
28	.00	3.82	.17	.01	.13	.08	.07	.00				
29	.00	9.39	.58	.01	.27	.94	.41	.00				
30	.00	.01	7.50	.07	2.31	1.88	.39	.00				
31	.10	.36	.77	.00	.06	4.27	.23	.00				
32	.00	.00	.01	.01	.32	.11	.00	.00				
33	.00	.00	.00	3.05	.04	.00	.00	.00				
34	.00	.00	.00	4.43	.01	.00	.00	.00				
35	.00	.00	.01	.00	.00	.00	.00	.00				
36	.00	.00	.00	.00	.00	.00	.00	.00				
37	.00	.00	.00	.00	.00	.00	.00	.00				
38	.00	.44	.00	.00	.00	.00	.00	.00				
39	.00	.00	.36	.00	.00	.00	.00	.00				
40	.00	.00	.00	15.81	.00	.00	.00	.00				
41	.00	.00	.07	.04	11.25	.15	.08	.00				
42	.00	.00	.00	.00	.00	.10	.00	.00				
43	.00	.00	.00	.00	.00	.00	1.72	.00				
44	.00	.00	.00	.00	.00	.00	.00	.00				
TOTAL	1.62	21.54	10.20	30.64	21.06	15.59	25.32	2.02				
								14.96				

$\text{SO}_4^{=}$ Wet Deposition Unit Transfer Matrix

July 1978

JULY 1978

TOTAL CONTRIBUTIONS TO SD4 MET DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	76.760	-202	7.794	2.35	2.10	.11	.31	.00	8.15	7.38	.00	.01
2	23.994	114.796	1.779	6.34	3.49	5.78	2.46	1.25	3.40	.97	.33	3.60
3	62.294	.000	102.536	.01	.17	.00	.03	.00	6.60	7.41	.00	.00
4	72.235	35.942	6.510	11.82	3.20	4.37	.32	.00	9.28	7.32	.00	.88
5	14.295	35.354	3.778	5.87	15.69	.08	6.14	1.89	10.90	8.57	1.11	1.02
6	22.725	.254	4.229	6.60	.01	5.33	.00	.00	.27	4.40	.00	.31
7	14.401	11.450	3.104	2.94	10.39	.06	11.52	1.35	4.61	4.25	3.19	1.12
8	22.596	101.771	.67	5.71	9.05	4.04	7.94	10.38	1.23	2.12	1.36	5.24
9	35.386	.000	7.100	.04	1.87	.00	.74	.00	23.93	6.19	.00	.00
10	.725	.000	1.889	.00	.00	.01	.00	.00	.10	7.47	.00	.00
11	.002	.000	.56	.00	.76	.00	.396	.00	2.20	.31	8.24	.00
12	15.597	22.225	11.04	.52	.01	2.65	.00	.01	.10	.50	.00	.00
13	.222	.712	.194	.02	.00	.76	.00	.00	.01	.00	.00	5.62
14	.000	.000	.071	.00	.03	.00	.04	.00	.03	.10	.00	4.55
15	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
32	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.000	.000	.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	507.000	62.590	65.22	44.76	48.10	31.02	36.62	15.19	76.63	81.62	23.56	23.24

JULY 1978

TOTAL DEPOSITIONS TO SDA MET DEPOSITION M6RMS/M2 WITHIN RECEPTOR REGIONS

EMITTER REGION	15	16	17	18	19	20	21	22	23	24
1	-100	-63	3.27	.00	.39	3.19	7.77	.00	.00	.00
2	-100	-50	.41	.02	.10	.16	.16	.00	.00	.00
3	-100	-27	4.25	.00	.50	2.37	10.84	.00	.00	.00
4	-100	-105	2.52	.00	.50	1.71	2.60	.00	.00	.00
5	-100	2.39	6.00	.00	1.40	2.28	7.26	.00	.00	.00
6	-100	-100	.95	.00	.33	1.15	1.63	.00	.00	.00
7	-100	-100	1.70	.00	.69	1.18	2.17	.00	.00	.00
8	-100	3.10	2.17	.09	.26	.08	2.02	.11	.27	.00
9	-100	-76	.41	.50	.00	.00	.00	.00	.00	.00
10	-100	-100	3.22	.00	.36	4.51	13.22	.00	.00	.00
11	-100	-100	.01	.00	.44	3.44	7.42	.00	.00	.00
12	-100	17.45	1.43	.23	.64	.00	.00	.00	.00	.00
13	-100	-100	.61	.00	.12	.03	.21	.00	.00	.00
14	-100	-100	.02	.00	.00	.01	.01	.06	.00	.00
15	-100	1.21	1.96	.00	.18	.54	.75	.00	.00	.00
16	-100	8.77	.01	.50	.00	.00	.00	.00	.00	.00
17	-100	7.43	1.36	.00	.67	.08	2.16	.00	.00	.00
18	-100	-100	13.15	.00	2.67	1.46	3.92	.00	.00	.00
19	-100	3.86	.11	4.58	.05	.00	.11	.00	.02	.00
20	-100	-100	.57	.00	.11	1.40	5.94	.00	.00	.00
21	-100	-100	.00	.00	2.70	6.46	3.75	.00	.00	.00
22	-100	-100	.16	.00	3.50	4.40	2.09	.00	.00	.00
23	-100	-100	.00	.00	.00	.00	.00	4.28	.01	.79
24	-100	-100	.00	.00	.00	.00	.00	.18	.00	.00
25	-100	-100	.00	.00	.00	.00	.00	.24	.00	.73
26	-100	-100	.00	.00	.00	.00	.00	.00	.00	.17
27	-100	-100	.29	.00	.04	2.30	.31	.00	.00	.00
28	-100	-100	.95	.00	.15	4.78	.12	.00	.00	.00
29	-100	-100	1.33	.00	.93	6.35	2.21	.00	.00	.00
30	-100	-100	.32	.00	.71	6.13	3.66	.00	.00	.00
31	-100	-100	.09	.00	.36	4.94	2.42	.00	.00	.00
32	-100	-100	.00	.00	.40	.42	.14	.00	.00	.00
33	-100	-100	.00	.00	.48	1.53	.10	.00	.00	.00
34	-100	-100	.00	.00	.02	.34	.00	.00	.00	.00
35	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
36	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
37	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
38	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
39	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
40	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
41	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
42	-100	-100	.00	.00	.26	2.73	1.30	.00	.00	.00
43	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
44	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
45	-100	-100	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	256.001	356.110	45.06	9.78	34.58	63.97	106.24	4.88	1.09	16.66

JULY 1978

TOTAL COMBUSTION LINES AND 100% NET DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS

EMITTER
REGION

	25	26	27	28	29	30	31	32	33	34	35	36
1	100	206	1142	228	397	285	14	125	188	91	00	00
2	231	484	26	549	81	51	09	08	08	08	00	53
3	160	160	103	04	101	193	01	108	428	304	00	00
4	775	175	722	722	523	352	33	94	39	05	00	00
5	201	712	219	114	401	259	14	145	134	22	00	00
6	164	1347	11157	1120	734	771	148	85	104	50	00	01
7	100	107	107	23	229	120	07	87	101	22	00	00
8	794	488	42	473	165	70	13	02	101	22	00	00
9	166	280	100	00	32	193	00	09	345	338	01	00
10	100	100	100	48	107	496	07	168	244	722	00	00
11	100	100	100	03	01	00	00	00	00	01	00	00
12	231	76	69	100	48	13	06	06	01	01	00	32
13	242	1167	101	11	01	21	03	06	00	00	00	482
14	100	100	100	00	00	00	00	00	02	01	00	00
15	104	100	100	00	00	00	00	00	00	00	00	00
16	104	100	100	00	00	00	00	00	00	00	00	00
17	104	100	100	00	00	00	00	00	00	00	00	00
18	104	100	100	00	00	00	00	00	00	00	00	00
19	104	100	100	00	00	00	00	00	00	00	00	00
20	104	100	100	00	00	00	00	00	00	00	00	00
21	104	100	100	00	00	00	00	00	00	00	00	00
22	104	100	100	00	00	00	00	00	00	00	00	00
23	104	100	100	00	00	00	00	00	00	00	00	00
24	104	100	100	00	00	00	00	00	00	00	00	00
25	104	100	100	00	00	00	00	00	00	00	00	00
26	104	100	100	00	00	00	00	00	00	00	00	00
27	104	100	100	00	00	00	00	00	00	00	00	00
28	104	100	100	00	00	00	00	00	00	00	00	00
29	104	100	100	00	00	00	00	00	00	00	00	00
30	104	100	100	00	00	00	00	00	00	00	00	00
31	104	100	100	00	00	00	00	00	00	00	00	00
32	104	100	100	00	00	00	00	00	00	00	00	00
33	104	100	100	00	00	00	00	00	00	00	00	00
34	104	100	100	00	00	00	00	00	00	00	00	00
35	104	100	100	00	00	00	00	00	00	00	00	00
36	104	100	100	00	00	00	00	00	00	00	00	00
37	104	100	100	00	00	00	00	00	00	00	00	00
38	104	100	100	00	00	00	00	00	00	00	00	00
39	104	100	100	00	00	00	00	00	00	00	00	00
40	104	100	100	00	00	00	00	00	00	00	00	00
41	104	100	100	00	00	00	00	00	00	00	00	00
42	104	100	100	00	00	00	00	00	00	00	00	00
43	104	100	100	00	00	00	00	00	00	00	00	00
44	104	100	100	00	00	00	00	00	00	00	00	00
TOTAL	1957	4561	16864	4785	9895	11146	3960	5990	6466	9465	2718	4665

JULY 1978

TOTAL CONTRIBUTIONS TO S04 NET DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS

EMITTER	37	38	39	40	41	42	43	44
1	.03	5.41	1.90	1.18	19.63	11.37	5.46	.25
2	1.67	.78	1.60	.01	.72	.62	2.56	.82
3	.00	.47	.04	5.50	15.42	18.71	14.12	.47
4	2.03	10.43	5.12	.06	3.27	4.07	5.50	1.03
5	.20	8.02	2.18	.06	5.29	7.56	4.33	12.92
6	5.29	16.32	22.11	.79	2.69	4.68	2.88	.00
7	.03	3.62	1.69	.58	2.42	3.24	3.74	21.74
8	2.17	1.13	2.44	.08	.93	1.86	.29	1.91
9	.00	.00	.02	4.20	20.19	19.83	10.24	1.35
10	.00	.16	3.59	6.11	4.42	3.80	1.52	.01
11	.00	.00	.00	.07	.22	.04	.64	9.38
12	.86	.66	.39	.00	.09	.05	1.08	.00
13	.66	.00	1.50	.00	.00	.00	.07	.00
14	.00	.00	.00	.03	.18	.00	.00	1.51
15	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.41	.27	.00	.00
17	.00	.00	.00	1.99	4.72	5.40	.11	.00
18	.00	1.45	.00	.00	.01	.01	.17	2.86
19	.00	.00	.00	8.58	2.37	3.04	.00	.00
20	.00	.00	.00	5.25	1.44	.07	.06	.00
21	.00	.00	.00	4.67	8.60	1.38	.11	.00
22	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.01	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.81
25	2.44	.00	5.26	.00	.00	.00	.00	.00
26	16.04	7.26	17.21	.05	1.36	.13	1.10	.00
27	43.86	13.36	34.51	.00	.44	.37	6.03	.00
28	.00	20.00	19.65	2.41	3.66	6.35	1.13	.00
29	.00	21.98	20.20	.58	4.91	5.17	.00	.00
30	.00	.06	46.87	.48	5.98	.23	.00	.00
31	6.83	3.51	13.90	.08	.00	.07	.00	.00
32	.00	.00	.30	.01	.00	.00	.00	.00
33	.00	.00	.00	1.76	.00	.00	.00	.00
34	.00	.00	.00	4.15	.00	.00	.00	.00
35	.00	.00	1.97	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.06	.00	.00	.00	.00	.00	.00
39	.00	.00	.09	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	10.07	.00	.00	.00	.00
42	.00	.00	.05	.02	4.00	.06	.01	.00
43	.00	.00	.00	.00	.00	.01	.00	.00
44	.00	.00	.00	.00	.00	.00	.78	.00
TOTAL	82.52	114.72	202.88	59.25	113.41	98.38	62.86	60.23

$\text{SO}_4^{=}$ Dry Deposition Unit Transfer Matrix

July 1978

JULY 1978
TOTAL CONTRIBUTIONS TO 304 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS

EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	16.16	.33	13.36	2.59	2.22	.99	.16	.00	10.77	10.66	.00	.03
2	4.55	16.93	1.76	7.22	3.34	5.45	3.56	3.21	1.77	1.64	.65	3.51
3	4.89	.02	17.85	.33	.06	.13	.01	.00	6.07	11.11	.00	.00
4	15.90	5.48	6.55	17.86	7.87	5.99	1.61	.41	7.33	6.06	.03	1.02
5	10.81	3.62	5.05	7.62	19.21	1.32	11.90	2.49	7.25	5.21	2.14	.62
6	10.10	.71	6.21	6.16	.39	11.63	.01	.00	3.45	8.15	.00	.43
7	6.45	1.87	4.06	3.14	10.56	.57	19.46	3.93	7.81	3.53	4.35	.42
8	4.16	9.68	1.67	6.66	5.05	4.62	7.69	17.19	1.94	1.66	1.53	2.89
9	4.54	.07	20.26	.69	1.89	.05	.63	.00	31.06	9.12	.00	.00
10	.56	.00	3.97	.00	.00	.01	.00	.00	.11	10.83	.00	.00
11	.21	.00	1.65	.01	1.74	.00	4.62	.00	4.67	.54	10.79	.00
12	1.57	3.57	.81	1.52	.45	4.67	.03	.09	.59	.75	.00	.00
13	.31	.62	.10	.16	.09	3.07	.00	.01	.01	.44	.00	6.43
14	.00	.00	.14	.00	.10	.00	.15	.00	.45	.09	.00	5.23
15	.00	.00	.01	.00	.05	.00	.21	.00	.27	.00	.15	.00
16	.00	.00	.70	.00	.12	.00	1.06	.00	1.53	.31	.88	.00
17	.02	.00	3.28	.00	.01	.00	.00	.00	1.78	4.54	.00	.00
18	.56	.10	.33	.41	1.00	.02	2.44	.20	1.06	.13	5.43	.00
19	.47	.00	2.54	.00	.00	.00	.00	.00	.07	3.34	.00	.00
20	.14	.00	5.17	.00	.00	.00	.00	.00	.58	2.44	.00	.00
21	.60	.00	4.26	.00	.00	.00	.00	.00	.26	4.66	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.09	.31	.61	.21	.30	.03	.85	.65	.07	.00	1.04	.03
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.17	.00
25	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	1.53	.60	2.34	.02	.00	2.98	.00	.00	.00	1.16	.00	1.06
27	.00	.00	3.55	.14	.00	6.42	.00	.00	.16	5.94	.00	.09
28	11.25	.16	11.79	.83	.06	5.66	.00	.00	.05	8.37	.00	.00
29	4.97	.31	8.28	.21	.03	2.79	.00	.00	3.58	15.98	.00	.00
30	.21	.00	4.50	.00	.00	1.14	.00	.00	1.02	18.12	.00	.05
31	.02	.00	.73	.00	.00	.00	.00	.00	.04	8.20	.00	.00
32	.00	.00	.64	.00	.00	.39	.00	.00	.00	4.79	.00	.00
33	.00	.00	.57	.00	.00	.00	.00	.00	.02	.02	.00	.00
34	.00	.00	.11	.00	.00	.00	.00	.00	.02	.57	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.50	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.15	.00	.00	.00	.00	.00	.00	.11	.00	.00
42	.00	.00	.92	.00	.00	.00	.00	.00	.07	.69	.00	.00
43	.00	.00	.07	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	102.35	43.99	133.03	55.86	54.55	57.94	54.70	28.18	93.87	149.88	29.00	21.99

EMITTER REGION	TOTAL CONTRIBUTIONS TO SO4 DRY DEPOSITION MG/MS/M2 WITHIN RECEPTOR REGIONS										1976			
	15	14	15	16	17	18	19	20	21	22	23	24	25	26
1	.00	1.75	.00	.01	4.05	.00	2.02	3.78	5.56	.00	.00	.00	.00	.00
2	.29	.77	.14	.75	.52	.08	.50	.41	.44	.00	.00	.00	.00	.00
3	.00	2.06	.00	.02	8.29	.00	4.57	5.95	8.04	.00	.00	.00	.00	.00
4	.05	2.52	.00	.48	3.02	.00	1.66	1.46	2.79	.00	.00	.00	.00	.00
5	.24	4.56	.76	3.93	2.65	.06	1.64	1.74	3.33	.00	.00	.00	.00	.00
6	.00	.81	.00	.00	1.31	.00	2.32	2.13	3.64	.00	.00	.00	.00	.00
7	.16	6.85	2.08	6.24	5.01	.15	2.12	1.17	2.24	.01	.02	.00	.00	.00
8	.53	.56	.42	1.22	.44	1.02	.73	.76	.93	.12	.46	.07	.00	.00
9	.00	4.81	.00	.05	9.32	.00	4.85	7.76	10.60	.00	.00	.00	.00	.00
10	.00	.66	.00	.00	5.56	.00	11.72	3.80	8.35	.00	.00	.00	.00	.00
11	.00	7.36	5.97	12.20	3.80	.54	1.54	.06	.27	.00	.00	.00	.00	.00
12	1.06	.19	.00	.00	.26	.00	.15	.15	.21	.00	.00	.00	.00	.00
13	12.56	.00	.00	.00	.02	.00	.00	.00	.00	.07	.00	.00	.00	.00
14	.00	10.25	.00	1.02	4.04	.00	.29	.10	.22	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	3.72	20.32	7.12	1.06	.39	.01	.00	.00	.00	.00	.00	.00	.00
17	.00	7.52	3.07	12.90	2.96	.00	.62	.02	.21	.00	.00	.00	.00	.00
18	.00	3.05	.00	.01	21.70	.00	9.60	2.08	3.43	.00	.00	.00	.00	.00
19	.00	1.57	2.93	3.64	.76	4.70	.06	.00	.06	.00	.00	.00	.00	.00
20	.00	.23	.00	.00	4.21	.00	18.95	3.47	7.46	.00	.00	.00	.00	.00
21	.00	.14	.00	.00	5.70	.00	9.48	21.12	7.06	.00	.00	.00	.00	.00
22	1.01	.00	.00	.00	2.76	.00	11.59	8.27	17.58	.00	.00	.00	.00	.00
23	.00	.19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.07	.00	.00	1.06	.00	.01	.02	.08	.00	.00	.00	.00	.00
28	.00	.19	.00	.00	1.72	.00	.50	1.60	1.17	.00	.00	.00	.00	.00
29	.00	.79	.00	.00	1.88	.00	1.17	3.07	1.56	.00	.00	.00	.00	.00
30	.00	.54	.00	.01	1.74	.00	4.26	4.10	6.85	.00	.00	.00	.00	.00
31	.00	.26	.00	.00	4.94	.00	2.72	4.24	7.07	.00	.00	.00	.00	.00
32	.00	.00	.00	.00	.34	.00	5.41	8.20	12.00	.00	.00	.00	.00	.00
33	.00	.00	.00	.00	.07	.00	.58	2.04	3.75	.00	.00	.00	.00	.00
34	.00	.06	.00	.00	4.02	.00	.80	11.00	1.98	.00	.00	.00	.00	.00
35	.00	.01	.00	.00	1.46	.00	1.87	3.61	1.40	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	1.63	.92	.47	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.32	.09	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	1.31	.00	.55	.34	.14	.00	.00	.00	.00	.00
42	.00	.03	.00	.00	.77	.00	2.13	4.24	3.65	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	17.24	62.09	36.32	50.25	106.86	11.00	106.25	108.14	122.62	7.89	3.47	22.41	.00	.00

JULY 1978

TOTAL CONTRIBUTIONS TO SO₄ DRY DEPOSITION MGRMS/M² WITHIN RECEPTOR REGIONS

EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.11	2.41	6.92	6.82	2.85	.16	.51	2.03	1.46	.00	.00
2	.30	1.12	1.62	3.21	2.04	.44	.17	.10	.14	.09	.00	.21
3	.00	.00	.10	1.09	1.09	1.25	.01	.60	4.77	4.71	.00	.00
4	.06	1.36	3.89	10.40	8.73	2.92	.34	.25	.38	.40	.01	.00
5	.02	.21	1.89	6.62	7.12	2.82	.15	.37	.95	1.11	.00	.00
6	.01	1.51	11.85	25.01	15.30	4.44	.96	1.21	1.26	.89	.00	.00
7	.00	.10	1.14	3.31	4.27	1.66	.08	.20	.79	.95	.02	.01
8	.41	1.06	2.38	2.81	2.14	.80	.08	.13	.49	.18	.00	.00
9	.00	.00	.01	.50	.57	.95	.01	.57	6.48	5.94	.00	.00
10	.00	.00	.00	.61	2.42	4.03	.09	1.09	2.51	6.08	.01	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.02	.11	.00	.00
12	.45	.90	1.84	1.86	1.23	.22	.08	.06	.09	.03	.00	.00
13	3.58	2.84	1.22	1.04	1.17	.25	.27	.00	.00	.00	.00	9.46
14	.00	.00	.00	.00	.00	.00	.00	.00	.07	.10	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.06	.00	.00
17	.00	.00	.00	.00	.00	.05	.00	.00	.01	5.97	.00	.00
18	.00	.00	.00	.30	.08	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.01	.08	.13	.00	.01	2.82	.00	.00	.00
20	.00	.00	.00	.00	.03	.79	.00	.24	17.97	20.63	.00	.00
21	.00	.00	.00	.05	.64	.70	.00	.12	8.46	13.46	.00	.00
22	.77	.13	.03	.00	.00	.00	.03	.00	.00	.00	.00	.00
23	.00	.00	.00	.02	.01	.00	.00	.00	.00	.00	.00	.35
24	.50	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	13.74	9.50	3.80	.12	1.80	1.28	1.92	.10	.01	.00	.03	25.88
26	.41	13.68	43.67	21.83	24.87	7.96	5.98	2.49	1.65	.73	.38	.00
27	.04	7.14	112.83	33.86	38.53	12.39	6.02	6.85	4.21	2.12	1.09	.00
28	.00	.34	4.65	31.99	29.11	10.13	1.00	2.51	1.89	1.28	.05	.00
29	.00	.31	2.25	17.67	36.73	11.43	1.54	3.84	2.94	2.02	.11	.00
30	.00	.00	.00	.41	1.66	20.00	1.09	6.51	4.96	5.08	.50	.00
31	.95	10.22	19.85	5.46	12.59	11.73	10.57	7.83	2.02	1.37	2.02	.00
32	.00	.00	.00	.00	.00	3.53	1.44	41.48	19.57	9.15	7.91	.00
33	.00	.00	.00	.00	.00	.00	.00	.64	26.09	26.26	.02	.00
34	.00	.00	.00	.00	.00	.00	.00	.21	3.73	20.25	.02	.00
35	.00	.03	.00	.00	.00	1.54	7.29	4.17	.41	.24	36.38	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.84
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.00	.00	.00	.00	.87	2.60	.00	.00
42	.00	.00	.00	.00	.06	.82	.00	.15	2.01	1.88	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	21.37	50.57	215.42	175.10	199.06	105.09	39.35	82.27	121.97	146.95	48.57	39.38

EMITTER	TOTAL CONTRIBUTIONS TO SO4 DRY DEPOSITION MGRMS/M2 WITHIN RECEPTOR REGIONS											
	JULY 1978											
	37	36	39	40	41	42	43	44				
1	.03	6.56	2.76	2.29	7.99	11.02	13.10	.44				
2	3.46	1.88	.07	.13	.45	1.20	1.72	.44				
3	.00	.82	.53	7.07	9.07	10.71	22.77	.20				
4	5.82	10.55	3.26	.96	2.77	5.00	6.70	2.88				
5	.37	7.88	2.52	1.33	4.50	4.22	4.09	11.49				
6	2.56	20.76	8.61	1.65	2.36	7.99	5.22	.04				
7	.07	3.37	1.07	1.63	2.84	2.50	3.25	19.90				
8	2.62	1.96	1.59	.24	.81	1.14	1.52	2.27				
9	.00	.38	.27	9.52	9.65	8.05	32.05	2.17				
10	.00	.35	3.05	11.63	5.20	9.98	4.13	.00				
11	.00	.00	.00	.46	.02	.00	2.21	14.66				
12	1.47	1.46	.29	.00	.13	.36	.53	.04				
13	3.99	.92	.60	.00	.01	.24	.05	.00				
14	.00	.00	.00	.27	.06	.00	.01	.00				
15	.00	.00	.00	.00	.00	.00	.00	.00				
16	.00	.00	.00	.25	.01	.00	.00	.00				
17	.00	.00	.00	11.62	1.61	2.61	.32	10.23				
18	.00	.17	.00	.00	.05	.04	.75	.04				
19	.00	.00	.00	28.30	2.90	3.69	.27	3.67				
20	.00	.00	.03	15.84	9.46	2.23	6.94	.00				
21	.00	.00	.01	12.67	7.01	8.14	1.64	.00				
22	.05	.00	.00	.00	.00	.00	.00	.00				
23	.00	.03	.00	.00	.00	.00	.00	.00				
24	.00	.00	.00	.00	.00	.00	.00	.62				
25	3.05	.17	3.46	.00	.03	.00	.00	.00				
26	9.51	60.06	11.67	.43	1.15	4.21	1.63	.00				
27	5.70	36.94	20.64	.68	2.45	3.37	1.67	.00				
28	.10	33.99	16.03	2.55	4.66	12.43	10.55	.00				
29	.06	39.06	15.79	3.26	5.91	17.35	4.53	.01				
30	.00	.66	30.04	6.46	10.49	18.04	5.67	.00				
31	2.36	9.56	13.63	.49	2.99	14.21	.79	.00				
32	.00	.00	.10	1.46	5.56	.01	.08	.00				
33	.00	.00	.00	14.95	.58	.01	.14	.00				
34	.00	.00	.00	12.77	.12	.00	.00	.00				
35	.00	.00	.51	.00	.33	.00	.00	.00				
36	.00	.00	.00	.00	.00	.00	.00	.00				
37	.00	.00	.00	.00	.00	.00	.00	.00				
38	.00	.00	.00	.00	.00	.00	.00	.00				
39	.00	.00	.12	.00	.00	.00	.00	.00				
40	.00	.00	.00	.00	.00	.00	.00	.00				
41	.00	.00	.00	16.60	.00	.00	.00	.00				
42	.00	.00	.34	1.24	9.47	.80	1.14	.00				
43	.00	.00	.00	.00	.00	.03	.00	.00				
44	.00	.00	.00	.00	.00	.00	.85	.00				
TOTAL	41.26	197.73	137.65	166.81	110.94	151.39	134.98	77.61				

$\text{SO}_4^{=}$ Ambient Concentration Unit Transfer Matrix
July 1978

JULY 1978												
TOTAL CONTRIBUTIONS TO SO4 CONCENTRATION UGRMS/M3 WITHIN RECEPTOR REGIONS												
EMITTER REGION	1	2	3	4	5	6	7	8	9	10	11	12
1	1.66	.04	1.62	.33	.27	.12	.02	.00	1.27	1.37	.00	.00
2	.64	1.79	.23	.87	.42	.70	.46	.39	.23	.22	.09	.45
3	.60	.00	1.83	.04	.01	.02	.00	.00	.72	1.38	.00	.00
4	1.94	.69	.85	1.79	.65	.76	.20	.05	.95	.80	.00	.13
5	1.37	.45	.66	.91	2.00	.17	1.43	.32	.94	.69	.27	.08
6	1.25	.09	.81	.79	.05	1.28	.05	.00	1.28	1.06	.00	.05
7	.83	.24	.54	.40	1.26	.07	1.99	.51	1.01	.47	.54	.06
8	.54	1.18	.22	.84	.65	.60	1.03	1.94	.26	.22	.20	.38
9	.56	.01	2.47	.09	.24	.01	.08	.00	3.20	1.18	.00	.00
10	.07	.00	.50	.00	.00	.00	.00	.00	.01	1.08	.00	.00
11	.03	.00	.24	.00	.22	.00	.53	.00	.61	.07	1.04	.00
12	.21	.43	.11	.20	.06	.58	.00	.01	.08	.10	.00	.67
13	.04	.06	.01	.02	.01	.40	.00	.00	.00	.06	.00	.65
14	.00	.00	.02	.00	.01	.02	.02	.00	.05	.01	.00	.00
15	.00	.00	.00	.00	.01	.00	.03	.00	.04	.00	.23	.00
16	.00	.00	.09	.00	.02	.00	.12	.00	.20	.04	.10	.00
17	.00	.00	.39	.00	.00	.00	.00	.00	.23	.53	.00	.00
18	.67	.01	.04	.05	.13	.00	.30	.03	.14	.02	.65	.00
19	.66	.00	.33	.00	.00	.00	.00	.00	.01	.41	.00	.00
20	.02	.00	.67	.00	.00	.00	.00	.00	.08	.31	.00	.00
21	.06	.00	.55	.00	.00	.00	.00	.00	.04	.61	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.01	.04	.00	.03	.04	.00	.11	.06	.01	.00	.14	.02
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.39	.00	.00	.00	.15	.00	.14
26	.20	.00	.31	.00	.00	.82	.00	.00	.02	.78	.00	.01
27	.24	.00	.46	.02	.00	.73	.00	.00	.01	1.10	.00	.00
28	1.42	.02	1.49	.11	.01	.35	.00	.00	.46	2.00	.00	.00
29	.64	.04	1.06	.03	.00	.15	.00	.00	.13	2.27	.00	.01
30	.03	.00	.58	.00	.00	.00	.00	.00	.00	1.02	.00	.00
31	.00	.00	.10	.00	.00	.05	.00	.00	.00	.63	.00	.00
32	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.00	.07	.00	.00	.00	.00	.00	.00	.07	.00	.00
34	.00	.00	.01	.00	.00	.00	.00	.00	.00	.07	.00	.00
35	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.12	.00	.00	.00	.00	.00	.01	.09	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	12.56	5.12	16.43	6.51	6.37	7.21	6.34	3.33	11.16	18.81	3.27	2.65

EMITTER REGION	JULY 1978										UGRMS/MS WITHIN RECEPTOR REGIONS									
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	.00	.22	.00	.00	.52	.00	.26	.50	.73	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	.04	.10	.02	.10	.07	.01	.07	.05	.06	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.26	.00	.00	.99	.00	.58	.05	1.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4	.01	.33	.00	.06	.40	.00	.22	.19	.37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.03	.60	.10	.51	.35	.01	.22	.23	.44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	.11	.00	.00	.17	.00	.31	.28	.44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7	.02	.66	.27	.80	.66	.02	.28	.15	.30	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8	.12	.07	.06	.16	.06	.13	.10	.10	.12	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	.60	.00	.01	1.16	.00	.64	1.02	1.39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10	.00	.06	.00	.00	.65	.00	1.52	.49	.98	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
11	.00	.96	.73	1.52	.50	.07	.20	.01	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.13	.02	.00	.00	.03	.00	.02	.02	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
13	1.39	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
14	.00	1.10	.00	.13	.49	.00	.04	.01	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.49	2.15	.89	.14	.05	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.96	.40	1.42	.39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.36	.00	.00	2.16	.00	.08	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.21	.37	.47	.10	.48	1.14	.27	.43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.03	.00	.00	.51	.00	.01	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.04	.00	.00	.74	.00	1.62	.44	.91	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.00	.02	.00	.00	.35	.00	1.14	.96	.86	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	.12	.00	.00	.00	.00	.00	1.25	.00	1.42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.03	.08	.07	.00	.51	.00	.00	.00	.83	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.11	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.01	.00	.00	.14	.00	.07	.21	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.02	.00	.00	.23	.00	.15	.41	.15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.10	.00	.00	.24	.00	.24	.54	.21	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.07	.00	.00	.23	.00	.56	.54	.90	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.03	.00	.00	.65	.00	.36	.56	.92	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.00	.00	.00	.00	.04	.00	.70	1.04	1.47	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
32	.00	.00	.00	.00	.01	.00	.08	.27	.49	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.00	.01	.00	.00	.53	.00	.10	1.43	.26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.00	.00	.00	.00	.19	.00	.24	.46	.18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.00	.00	.00	.00	.00	.00	.24	.12	.06	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.01	.00	.00	.00	.00	.00	.00	.04	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.00	.00	.00	.00	.10	.00	.07	.04	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.26	.49	.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	1.56	7.79	4.16	6.16	13.01	1.28	12.31	13.26	14.73	.89	.38	2.63								

JULY 1978												
TOTAL CONTRIBUTIONS TO SO4 CONCENTRATION UGRMS/M3 WITHIN RECEPTOR REGIONS												
EMITTER REGION	25	26	27	28	29	30	31	32	33	34	35	36
1	.00	.01	.32	.86	.89	.38	.02	.07	.27	.18	.00	.00
2	.04	.15	.21	.42	.27	.06	.02	.01	.02	.01	.00	.03
3	.00	.00	.01	.14	.14	.16	.00	.08	.43	.57	.00	.00
4	.01	.18	.51	1.35	1.15	.39	.05	.03	.05	.05	.00	.00
5	.00	.03	.25	.87	.94	.25	.02	.05	.13	.15	.00	.00
6	.00	.20	1.55	3.04	1.98	.59	.13	.16	.17	.11	.00	.00
7	.00	.01	.15	.43	.56	.22	.01	.03	.10	.12	.00	.00
8	.03	.14	.31	.37	.28	.11	.02	.02	.06	.02	.00	.00
9	.00	.00	.00	.07	.08	.12	.00	.08	.86	.75	.00	.00
10	.00	.00	.00	.08	.30	.50	.01	.14	.33	.75	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
12	.06	.12	.24	.24	.16	.03	.01	.01	.01	.00	.00	.06
13	.46	.37	.16	.14	.16	.03	.04	.00	.00	.00	.00	1.15
14	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
17	.00	.00	.00	.00	.00	.01	.00	.00	.31	.70	.00	.00
18	.00	.00	.00	.04	.01	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.01	.02	.00	.00	.36	1.16	.00	.00
20	.00	.00	.00	.00	.00	.10	.00	.03	2.22	2.54	.00	.00
21	.00	.00	.00	.01	.06	.09	.00	.02	1.08	1.55	.00	.00
22	.10	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.06	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	1.66	1.24	.50	.02	.24	.17	.25	.01	.00	.00	.00	3.10
26	.05	1.60	4.87	2.81	3.21	1.05	.77	.33	.22	.09	.05	.00
27	.00	.89	7.93	4.28	4.81	1.63	.76	.90	.56	.28	.14	.00
28	.00	.05	.61	3.52	3.66	1.33	.13	.33	.25	.16	.01	.00
29	.00	.04	.29	2.18	4.19	1.48	.20	.51	.39	.26	.07	.00
30	.00	.00	.00	.05	.21	2.19	.14	.85	.65	.64	.07	.00
31	.12	1.29	2.55	.71	1.65	1.52	1.29	1.02	.27	.17	.26	.00
32	.00	.00	.00	.00	.00	.44	.19	4.90	2.44	1.16	1.02	.00
33	.00	.00	.00	.00	.00	.00	.00	.08	2.71	3.04	.00	.00
34	.00	.00	.00	.00	.00	.00	.00	.03	.42	2.05	.00	.00
35	.00	.00	.00	.00	.00	.20	.92	.54	.05	.03	4.41	.00
36	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.24
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.28	.00	.00
41	.00	.00	.00	.00	.01	.10	.00	.02	.26	.22	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	2.63	6.33	20.48	21.63	25.00	13.28	5.01	10.25	14.95	17.09	5.99	4.64

EMITTER	JULY 1978									
	TOTAL CONTRIBUTIONS TO SO ₂ CONCENTRATION					UGRS/M ³ WITHIN RECEPTION REGIONS				
1	.00	.86	.37	.39	.40	.41	.42	.43	.44	.46
2	.46	.25	.09	.09	.02	.06	.16	.23	.22	.22
3	.00	.11	.07	.07	.79	1.16	1.38	2.62	.03	.37
4	.77	1.39	.43	.33	.17	.60	.66	.88	.54	1.49
5	.05	1.04	.33	.14	.21	.31	1.05	.68	.01	.01
6	.33	2.66	1.14	.21	.20	.38	.33	.43	2.45	.30
7	.01	.44	.21	.03	.11	.15	.20	.30	.30	.30
8	.35	.26	.21	.04	1.19	1.26	1.04	3.86	.28	.28
9	.00	.05	.39	.39	1.35	.65	1.16	.52	.00	.00
10	.00	.00	.00	.00	.06	.00	.00	.29	1.83	.00
11	.00	.00	.00	.00	.00	.02	.05	.07	.00	.00
12	.19	.19	.04	.04	.00	.00	.03	.01	.00	.00
13	.53	.12	.08	.08	.03	.01	.00	.00	.37	.37
14	.00	.00	.00	.00	.00	.00	.00	.00	.34	.34
15	.00	.00	.00	.00	.00	.00	.00	.00	1.22	.00
16	.00	.00	.00	.00	.03	.00	.00	.04	.01	.01
17	.00	.00	.00	.00	1.20	.23	.33	.09	.00	.00
18	.00	.02	.00	.00	.06	.01	.01	.04	.48	.48
19	.00	.00	.00	.00	3.27	.38	.48	.08	.00	.00
20	.00	.00	.00	.00	1.89	1.16	.29	.90	.00	.00
21	.00	.00	.00	.00	1.36	.83	1.02	.24	.00	.00
22	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.40	.02	.46	.46	.00	.00	.24	.00	.00	.00
26	1.22	2.60	1.34	.04	.15	.56	.21	.00	.00	.00
27	.75	4.71	2.72	.10	.32	.44	.19	.00	.00	.00
28	.01	4.23	2.12	.31	.61	1.60	1.38	.00	.00	.00
29	.01	4.75	2.07	.40	.77	2.21	.56	.00	.00	.00
30	.00	.08	3.64	.80	.80	1.29	.74	.00	.00	.00
31	.31	1.25	1.77	.05	.39	1.88	.10	.00	.00	.00
32	.00	.00	.01	.21	.72	.00	.01	.00	.00	.00
33	.00	.00	.00	1.76	.07	.00	.02	.00	.00	.00
34	.00	.00	.00	1.44	.02	.00	.00	.00	.00	.00
35	.00	.00	.07	.00	.04	.00	.00	.00	.00	.00
36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.00	.00	.00	1.45	.00	.00	.00	.00	.00	.00
41	.00	.00	.04	.12	.75	.10	.15	.00	.00	.00
42	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00
44	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00
TOTAL	5.40	25.22	17.78	18.86	13.77	19.36	16.75	9.61		

APPENDIX B

UNIT TRANSFER MATRICES FOR 11 CONSOLIDATED EMISSION REGIONS AND 9 SENSITIVE RECEPTOR REGIONS FOR JANUARY AND JULY 1978

The large unit transfer matrices (Appendix A) were condensed by consolidating 35 emission regions (ignoring the emissions from the sensitive receptors) into 11 regions (Figure B-1). The emission rate for each of these 11 regions was normalized to 1.0 Tg S yr^{-1} . The resulting transfer matrices, presented in this appendix, show the effects of sulfur emissions from each of the 11 regions on the wet and dry depositions of sulfur and ambient concentrations of SO_2 and $\text{SO}_4^{=}$ across the 9 sensitive receptor areas. The units of the sulfur wet and dry depositions are $\text{kg S ha}^{-1}(\text{Tg S yr}^{-1})^{-1}$; those of the concentrations are $\text{mg m}^{-3}(\text{Tg S yr}^{-1})^{-1}$.

The location of the 9 sensitive receptor areas are indicated in Figure 3. The abbreviations used in this appendix are:

<u>Abbreviation</u>	<u>Sensitive Receptor Area</u>
BW	Boundary Waters
ALG	Algoma, Ontario
MUS	Muskoka, Ontario
QUE	Laurentian Mountains, Quebec
SNS	Southern Nova Scotia
NH	Northern New Hampshire
ADIR	Adirondack Mountains
PENN	Central Pennsylvania
SMOK	Great Smoky Mountains National Park



Figure B-1. The 11 consolidated emission regions used in the condensed transfer matrices.

JANUARY 1978

EMISS REG	BW	ALG	MUS	QUE	SNS	NH	ADIR	PENN	SMOK
S Wet Deposition	1	.000	.000	.000	.001	.186	.002	.000	.000
	2	.000	.000	.011	.030	.009	.274	.058	.011
	3	.037	.011	.233	.018	.000	.044	.093	.011
	4	.004	.002	.000	.000	.000	.001	.000	.000
	5	.000	.000	.001	.044	.034	.175	.091	.164
	6	.000	.000	.059	.003	.000	.006	.044	.194
	7	.000	.000	.005	.004	.001	.027	.087	.064
	8	.000	.000	.000	.000	.001	.002	.002	.001
	9	.000	.001	.001	.001	.000	.005	.006	.004
	10	.019	.007	.024	.007	.000	.002	.007	.006
	11	.001	.001	.000	.000	.000	.003	.000	.001
S Dry Deposition	1	.000	.000	.000	.000	.826	.008	.001	.001
	2	.000	.034	.047	.356	.088	.472	.109	.013
	3	.161	.069	.988	.059	.010	.072	.279	.046
	4	.008	.002	.001	.001	.000	.000	.001	.000
	5	.000	.000	.007	.026	.176	.310	.199	.058
	6	.000	.000	.063	.009	.008	.021	.055	.938
	7	.000	.000	.001	.002	.017	.025	.057	.067
	8	.000	.000	.000	.000	.000	.001	.000	.001
	9	.000	.001	.014	.005	.003	.004	.009	.034
	10	.098	.025	.064	.008	.002	.006	.020	.049
	11	.002	.002	.001	.000	.000	.000	.001	.000
SO ₂ Concentration	1	.000	.000	.000	.001	4.489	.046	.004	.004
	2	.000	.201	.252	2.166	.409	2.862	.628	.051
	3	.980	.407	5.974	.331	.031	.396	1.611	.245
	4	.035	.003	.001	.000	.000	.000	.000	.000
	5	.000	.000	.037	.144	.867	1.907	1.205	.349
	6	.000	.001	.350	.045	.033	.111	.312	5.761
	7	.000	.000	.005	.011	.075	.143	.344	.398
	8	.000	.000	.000	.000	.000	.002	.000	.002
	9	.000	.004	.067	.020	.006	.015	.040	.179
	10	.568	.133	.365	.040	.005	.026	.108	.274
	11	.008	.003	.001	.000	.000	.000	.001	.000
SO ₄ Concentration	1	.000	.000	.000	.004	.939	.030	.006	.013
	2	.000	.108	.360	.584	.563	.988	.476	.268
	3	.259	.227	1.962	.341	.183	.494	1.155	.361
	4	.100	.064	.033	.030	.001	.010	.027	.014
	5	.000	.000	.036	.170	.445	.463	.387	.253
	6	.000	.003	.377	.085	.113	.150	.305	1.111
	7	.000	.000	.015	.030	.126	.115	.176	.206
	8	.000	.000	.000	.000	.009	.011	.014	.025
	9	.000	.031	.161	.102	.084	.089	.153	.285
	10	.385	.175	.293	.114	.046	.084	.156	.269
	11	.052	.057	.051	.002	.002	.016	.027	.016

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	EMISS REG	BW	ALG	MUS	QUE	SNS	NH	ADIR	PENN	SMOK
S Wet Deposition	1	.000	.000	.000	.003	.086	.000	.000	.000	.000
	2	.000	.009	.007	.245	.002	.067	.002	.000	.000
	3	.164	.068	.286	.089	.002	.009	.032	.017	.000
	4	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	.000	.000	.001	.006	.078	.074	.069	.008	.000
	6	.000	.000	.016	.003	.015	.114	.144	.314	.006
	7	.000	.000	.000	.000	.008	.022	.018	.004	.039
	8	.000	.000	.001	.000	.000	.001	.000	.001	.109
	9	.000	.005	.022	.009	.001	.009	.014	.021	.102
	10	.044	.018	.065	.030	.001	.003	.009	.013	.000
	11	.000	.000	.000	.000	.000	.000	.000	.000	.002
S Dry Deposition	1	.000	.000	.000	.001	.532	.004	.000	.000	.000
	2	.000	.009	.036	.596	.015	.200	.327	.023	.000
	3	.312	.056	.826	.090	.005	.026	.143	.048	.000
	4	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	.000	.000	.001	.013	.405	.291	.288	.066	.000
	6	.000	.000	.025	.005	.030	.095	.161	1.420	.017
	7	.000	.000	.000	.000	.085	.015	.028	.019	.123
	8	.000	.000	.000	.000	.001	.000	.000	.004	.332
	9	.000	.013	.028	.007	.003	.009	.013	.033	.237
	10	.170	.028	.129	.016	.002	.005	.028	.019	.000
	11	.002	.000	.000	.000	.000	.000	.000	.000	.002
SO ₂ Concentration	1	.000	.000	.000	.003	2.493	.016	.000	.000	.000
	2	.000	.035	.125	2.760	.026	.898	1.461	.078	.000
	3	1.504	.223	3.723	.229	.003	.084	.585	.183	.000
	4	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	.000	.000	.005	.054	1.640	1.364	1.352	.277	.000
	6	.000	.000	.084	.007	.040	.337	.662	6.767	.069
	7	.000	.000	.000	.000	.266	.058	.123	.089	.594
	8	.000	.000	.000	.000	.000	.000	.000	.011	1.55
	9	.000	.022	.054	.004	.001	.008	.020	.111	1.069
	10	.797	.096	.523	.026	.000	.009	.094	.062	.001
	11	.008	.000	.000	.000	.000	.000	.000	.000	.003
SO ₄ Concentration	1	.000	.000	.000	.023	1.067	.045	.000	.006	.000
	2	.000	.103	.446	1.809	.355	.801	1.358	.285	.000
	3	.620	.480	3.282	1.781	.170	.373	1.010	.474	.000
	4	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	.000	.000	.011	.100	1.968	.755	.736	.434	.000
	6	.000	.002	.339	.157	.753	1.168	1.287	2.696	.121
	7	.000	.000	.000	.000	.614	.121	.167	.046	.188
	8	.000	.000	.005	.000	.021	.003	.003	.092	.965
	9	.006	.326	.677	.242	.106	.301	.371	.455	.964
	10	.410	.350	.999	.418	.069	.109	.375	.253	.003
	11	.023	.003	.002	.000	.000	.000	.000	.002	.041